MODERN PLASTICS

E. F. LOUGEE, EDITOR • DR. G. M. KLINE, TECHNICAL EDITOR • C. A. BRESKIN, PUBLISHER

NOVEMBER 1938 VOLUME 16 NUMBER 3

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Cover color this month AMBER BROWN (Created by Textile Color Card Association)

Published the 5th of each month by Breskin & Charlton Publishing Corporation, 122 E. 42nd St. (Chanin Bldg.), New York, N. Y. Telephone Ashland 4-0655. Western office, 221 N. La Salle St., Room 616, Chicago, Ill. Telephone Randolph 6336. Publication office, Twentieth and Northampton Sts. Easton, Pa. Also publishers of Modern Packaging, Packaging Catalog.

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Subscription price $5.00 per year in United States, its possessions and Canada. All other countries, $6.00 per year. Price this issue, 50c per copy.
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Acceptance under the Act of June 5, 1934, at Easton, Pa., authorized Nov. 24, 1936. Back numbers dated 3 months or more preceding current issue, when available, $1.00 per copy, excepting October issues which are $2.00.

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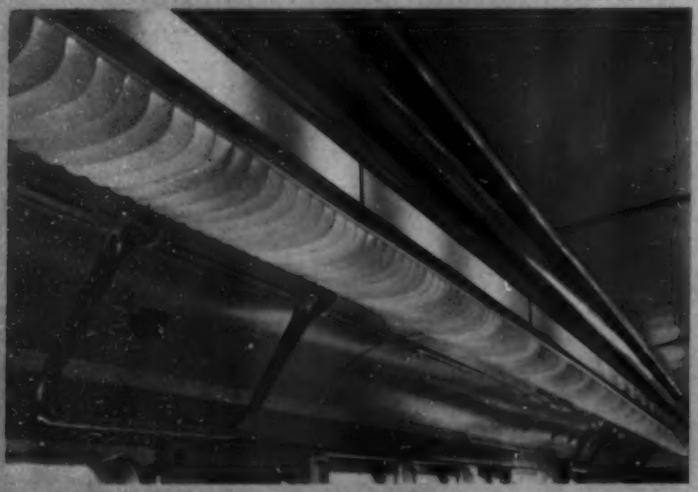
• DECEMBER

Biological specimens are being imbedded in clear methacrylate resin by the Bureau of Chemistry and Soils of the U. S. Department of Agriculture for permanent preservation. Excellent examples of the work were among the entries in the Annual Modern Plastic Competition and were given Third Award in the Scientific Group. Additional individual specimens will be shown in our December issue and the technique of imbedding will be described.

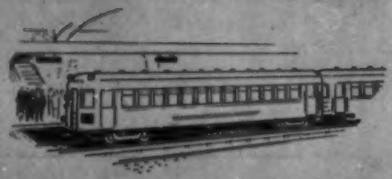
ACHIEVEMENT

Translucent INSUROK, the new Richardson plastic, in many pastel tints and rich, deep colors, offers artist, architect, designer and engineer a medium of numerous practical possibilities that adapts itself admirably to modern technique in building construction and decorative arts. Possessing the chemical and physical characteristics of opaque INSUROK, this new translucent plastic is available in two types, with surface finishes ranging from dull matte to a high polish, and in many forms . . . sheets, rods and tubes, laminated or molded . . . in sizes and gauges to meet countless fabrication requirements, or in finished parts ready for assembly.

Shown are two widely diversified uses for Translucent INSUROK which received awards and special mention in the Third Annual Modern Plastics Competition. Where new, distinct and unusual results must be achieved, Translucent INSUROK is the favored material.



In this modern subway car panels of Translucent INSUROK placed above the lighting fixture permit a soft, diffused light to reach walls and ceiling of the car, at the same time adding to the distinctive appearance of the lighting fixture itself.



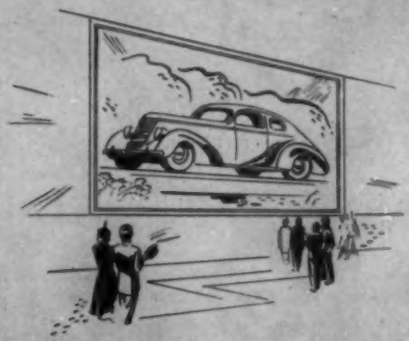


Photo mural in which a photograph is incorporated in the assembly of laminated Translucent INSUROK, forming an integral panel unit. The design is fully protected against surface injury. Beauty and appeal of the mural are further enhanced by placing lights behind display.

An interesting, illustrated folder containing the story of the versatility of Translucent INSUROK will be sent on request. Consult Richardson engineers about any contemplated use of Translucent INSUROK. No obligation, of course.

TRANSLUCENT INSUROK

The RICHARDSON COMPANY

Melrose Park, (Chicago) Ill. *Founded 1858* Lockland, (Cincinnati) Ohio
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MODERN PLASTICS

NOVEMBER 1938 VOLUME 16 NUMBER 3

THIRD COMPETITION AWARDS

The entries in this national annual event are on display at the New Home of MODERN PLASTICS, 26th floor, Chanin Building, New York City, where our readers are cordially invited to review them

EACH YEAR EXHIBITS THE AMAZING PROGRESS PLASTICS ARE making as new industrial materials and there is, perhaps, no place where the result is more evident than in the hundreds of entries submitted in the Competition by leading manufacturers of all sorts of merchandise and industrial parts.

Those engaged in engineering and design, display an increasing understanding of the possibilities as well as the limitations of these new materials and the resulting skill and ingenuity shown in the entries made their judging difficult indeed. For one thing, it became obvious that plastics have reached an acceptance in the automotive and aircraft fields sufficient to warrant a new classification to take them out of the Industrial Group. Therefore, the Transport Group was added this year which makes six classifications instead of the five announced. Those entries which won Awards and Honorable Mention are pictured and described on the pages that follow.

Awards will be presented to those companies entering and participating in the winning entries, at a dinner to be given in the Grand Ball Room of the Hotel New Yorker, New York City, on the evening of November 15th. A preview of the new film "*Modern Plastics Preferred*" in which the entries will be shown in full color, will follow the presentation of awards.

FIRST AWARD

THE LAMSON COMPANY, INC., SYRACUSE, N. Y., WINS FIRST AWARD in the Industrial Group for its Pneumode Despatch Tube Terminal and Pneumatic Despatch Tube Carrier.

"In redesigning the Terminal," says J. S. McCullough (Lamson Co.), "plastic material was chosen because it could be molded easily into the desired modern design; the product was light weight and durable; and a wide range of color effects could be obtained to harmonize and blend with store appointments.

"The Tube is used to carry messages, documents, orders and cash from one point to another in the store, office or factory where the system is installed. The transparent plastic body has several obvious advantages, such as visibility of contents, attractive appearance, lightness in weight and durability."

The Terminal, molded by Diemolding Corporation, of Bakelite, a phenolic material made by Bakelite Corporation, was designed by Lamson Co. The Tube Carrier, formed from sheets of transparent Monsanto CA, a cellulose acetate plastic supplied by Plastics Division of Monsanto Chemical Co., was designed jointly by Lamson Co. and Monsanto Chemical Company.

SECOND AWARD

THE DENTISTS' SUPPLY COMPANY OF NEW YORK, NEW YORK CITY, receives Second Award in the Industrial Group with Its Dentsply Sectional Tooth Cabinet for dentists' offices.

Lack of space in dental operating rooms, according to the Dentists' Supply Co., has frequently prevented dentists from purchasing proper equipment to aid in selecting teeth for bridge and plate work. The need for a single unit, occupying little space, to house necessary guides or stocks of teeth, and one that at the same time would fit in well with other dental equipment, prompted the design of this plastic sectional cabinet.

The cabinet consists of top, base and intermediate drawer units, two drawers, $11^1/_2$ by $13^1/_2$ in., to each unit. It can be enlarged at little expense, simply by removing the top, inserting additional drawer units, and fastening the assembly together by means of extension screw rods at the four corners. The entire unit is reinforced against distortion, warp, unequal stress or binding. The drawers slide smoothly in or out on side rails and because they are accurately molded will not warp or stick.

The Cabinet, designed and produced by Associated Attleboro Manufacturers, Inc., is molded of Bakelite.

INDUSTRIAL THIRD AWARD

THE USONA MANUFACTURING COMPANY, INC., TOLEDO, OHIO, TAKES Third Award in the Industrial Group with its Kwik-lite Comet Flashlight. The flashlight, molded entirely of plastics, has a pre-focused bulb, with a powerful 750 feet beam, in a silver plated die cast reflector; a spare bulb holder at the end of the handle; a bulb shock absorber; fins on the case to prevent rolling; and an assortment of colors from which to choose.

Because of their rust-, corrosion- and mar-proof qualities, plastics were selected to replace the all metal case. They permitted an entirely new streamlined contour with rich color and long-lasting luster. In addition, the use of plastics made it possible to eliminate fourteen parts and with them, assembly and manufacturing costs, as well as the trouble these parts developed through wear.

The body of the Flashlight is of Bakelite; switch ring and lens of Tenite, a cellulose acetate compound produced by Tennessee Eastman Corp.; inside shock absorber and spare bulb holder, of Beetle, a urea material supplied by Beetle Products Division of American Cyanamid Co. Designed by R. G. Williams, of the Usona Mfg. Co., the various parts are molded by Detroit Molded Products Company.

TRANSPORT

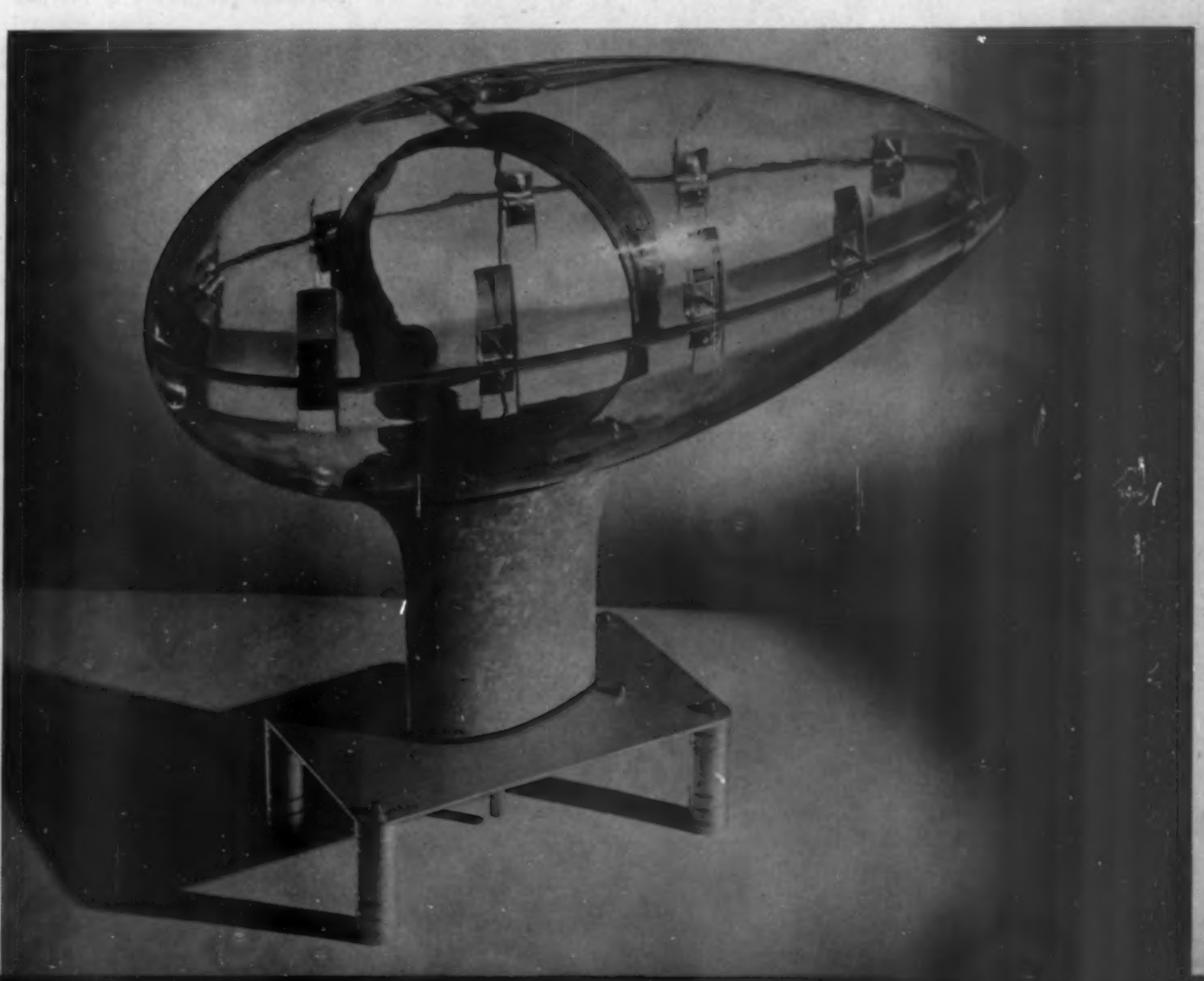
FIRST AWARD

LEAR DEVELOPMENTS, INC., MINEOLA, L. I., IS AWARDED FIRST PLACE in the Transport Group for its Learadio Radio Direction Finder, which comprises a rotatable direction finding radio compass loop, or goniometer, enclosed in a transparent, dirigible-shaped housing for mounting above or below the fusilage of an airplane.

The streamlined housing produces less aerodynamic drag on the high speed airplane than would the loop alone. The housing also protects the loop from air stream forces which would tend to bind the loop and prevent its free rotation. Sleet, rain, snow and moisture are excluded and the loop is also protected from injury and misalignment.

The housing must and does withstand severe strains, shocks and vibration. It must withstand extreme and sudden changes in temperature and humidity. At the same time it is light in weight and has high electrical insulation efficiency.

The housing is molded by Insulation Mfg. Co. of Crystalite, an acrylic molding material made by Röhm & Haas Co., Inc. The loop form is laminated Synthane (Bakelite resin), $8^1/_8$ in. in diameter, machined by Insulating Fabricators, Inc., and mounted on a block of Lucite, a cast methyl methacrylate resin made by E. I. du Pont de Nemours & Co., Inc., machined to rotate over electrical contact brushes. Silver is electrically plated onto the Lucite to provide "slip rings" through which contact may be made to the rotating loop.



TRANSPORT SECOND AWARD

THE CHRYSLER CORPORATION, Detroit, Mich., wins Second Award in the Transport Group with its company designed Glove Box Door and Instrument Panel, which represent the first large pieces to be produced combining plastics and metal integrally.

The combination of cellulose acetate, injection molded over metal stampings, is a comparatively recent development. The stamping provides the necessary strength and rigidity, for this application, while the plastic supplies a smooth, lustrous finish in colors or mottles to harmonize with automobile interiors. Any scratches or blemishes inflicted on the surface, either during the assembly operation or in service, can be buffed out easily and quickly, and keeping the parts clean is a simple matter.

These parts are made of Tenite, which is injection molded by Thermo-Plastics, Inc., over metal stampings made by Firestone Tire & Rubber Company.

TRANSPORT THIRD AWARD

THE LOCKHEED AIRCRAFT CORporation, Burbank, Calif., receives Third Award in the Transport Group for its Airplane Window Reveal, the first to be produced in this country although used for sometime in England.

Aircraft construction required materials that, among other requisites, are sturdy, light in weight, non-burnable, and impervious to sudden and complete changes in atmospheric conditions. Because certain types of plastics have these characteristics, they are being specified more and more often by the aircraft industry.

The plastic Window Reveal, installed in Lockheed Aircraft Corporation's planes, is eighteen inches long by fourteen inches wide and weighs but approximately one pound. Not only is the canvas based phenolic material used strong and durable, but its attractive walnut finish adds distinction to the interior trim of the plane. The Reveal is molded by H. Paulis, Inc., of Bakelite with fabric filler.

FIRST AWARD

E. I. DU PONT DE NEMOURS & CO., Inc., Arlington, N. J., wins First Award in the Scientific Group with its Transparent Surgical Splints. Designed by Dr. E. W. Probst, of the same company, the splints are made of Lucite.

From all indications these transparent plastic splints, although still in the experimental stage, are destined to become important surgical aids. By dipping in hot water, they may be shaped quickly and easily to any part of the anatomy where a fracture occurs. They are more comfortable than metal, plaster or wood used for the same purpose because they are lighter in weight and never unpleasantly warm or cold to the touch when applied. Bandages wrapped around the splints make a smooth, neat medical dressing.

Their transparency permits perfect X-ray photographs to be taken and allows periodic examination of the wound or skin without removing the splints.

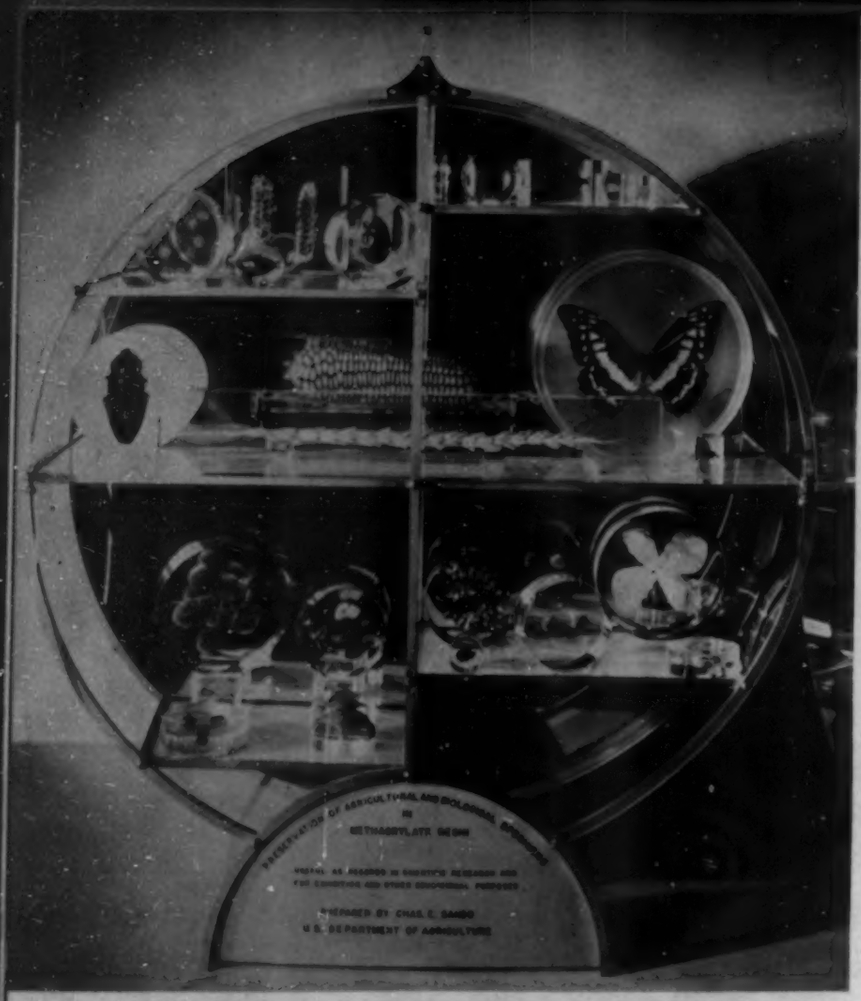
These plastic splints are said to be inexpensive accessories for they can be thoroughly cleaned and reshaped by heat, making it possible to use them over and over again if necessary to do so.

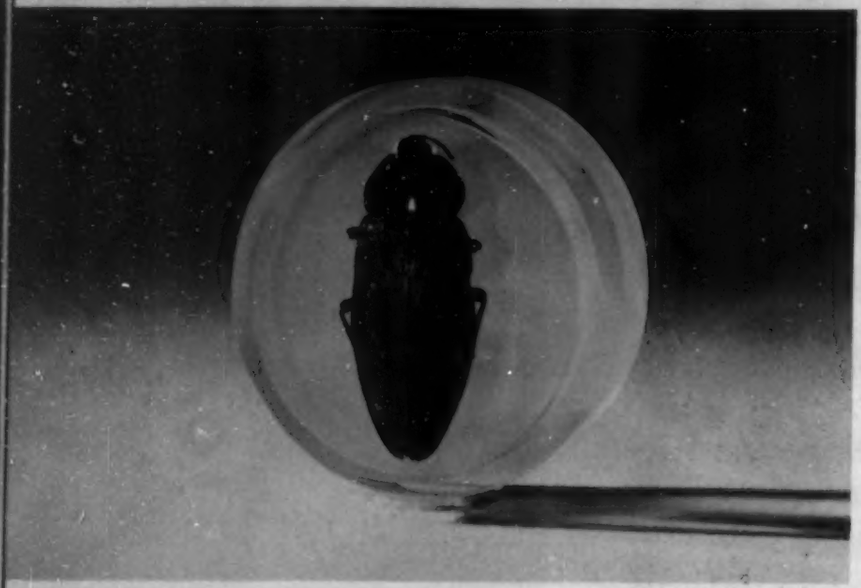
SECOND AWARD

MERCK & COMPANY, RAHWAY, N. J., RECEIVED SECOND AWARD IN the Scientific Group with its Closure for Acid Containers. For the protection of laboratory workers and others who have occasion to use acid containers frequently, this molded closure has replaced glass stoppers which are inclined to stick in the bottle or break and spatter acid on those in its vicinity.

The new transparent amber polystyrene closure—matching the amber bottle it caps—provides a sure seal which can be removed and replaced easily at all times. It is lined with a glass cloth which has the resilience necessary to make it suitable for a cap seal. In addition, this glass cloth is impregnated with a special material that makes it impervious to the action of acid.

The Closure, designed by Stanley W. Burnham, of Merck & Co., is injection molded by Mack Molding Company, of Bakelite polystyrene. Polystyrene was chosen for this application because it has been found to be the only plastic that resists satisfactorily the action of nitric and sulphuric acids.





SCIENTIFIC THIRD AWARD

THE BUREAU OF CHEMISTRY and Soils, U. S. Department of Agriculture, Washington, D. C., wins Third Award in the Scientific Group with its Agricultural and Biological Specimens Exhibit. These specimens, designed, cast, machined and polished by Dr. Charles E. Sando, Senior Biochemist of the Bureau, are imbedded in a methacrylate resin produced by Röhm & Haas Company, Incorporated.

"This exhibit," says Henry G. Knight, Chief of the Bureau, "represents an attempt to preserve agricultural and biological specimens, retaining their natural size, color and shape. The method of mounting permits the specimens to be encased intact in solid, glass-clear methacrylate plastic where they may be viewed from any angle. It is believed that specimens so preserved will possess considerable value as permanent records in scientific research and for exhibition and other educational purposes."

FIRST AWARD

THE REX COMPANY, INC., BOSton, Mass., receives First Award in the Decorative Group for its Laminated Venetian Blind. These blinds, which are available in a series of colors to blend with practically any interior color scheme, possess many features made possible only through the use of plastics. For instance, the slats are translucent. Artificial or natural light passing through them softens to a tinted glow, similar to the effect achieved with stained glass. The plastic used gives a permanent fire-resistant finish that may be cleaned easily. Being a non-conductor of heat, it helps keep the room comfortable during hot weather.

The translucent slats are designed to permit maximum light diffusion and ventilation, and at the same time, nest compactly when the blind is raised.

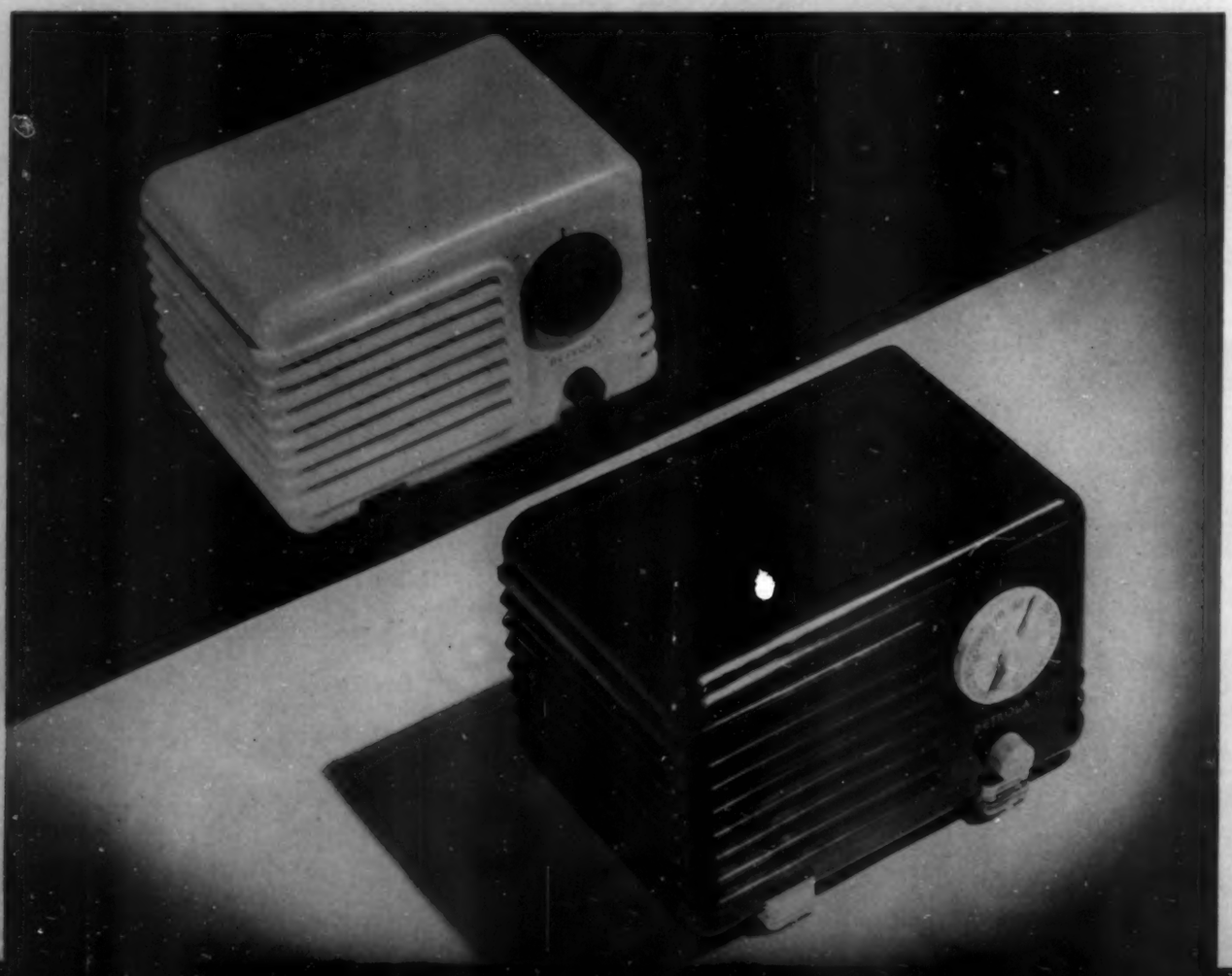
The slats in the blind are built of Lamicoid, a laminated material made by Mica Insulator Company, which is impregnated with Bakelite phenolic resin. Mica Insulator Company is responsible for the design.

DECORATIVE SECOND AWARD

THE DETROLA CORPORATION, DETROIT, MICH., WINS SECOND AWARD in the Decorative Group with its Pee Wee Radio Cabinet, designed by George Walker.

To provide adequate strength without adding unnecessarily to the bulk; to offer a sufficiently wide choice of colors to appeal to a variety of tastes and to fit in with any decorative scheme; to achieve a distinctive appearance which would make the receiver stand out in competition; and at the same time, to provide a cabinet that would reflect the high quality of the receiver and still be inexpensive to produce—these were necessary requirements in the development of the Pee Wee Radio Cabinet that were met satisfactorily only by using molded plastics.

The housings are molded by Chicago Molded Products Company, of walnut Durez, a phenolic material produced by General Plastics, Inc.; Bakelite, for black cabinets; and ivory and light colored Plaskon, a urea material made by Plaskon Company, Inc. Black and white dials and feet are of Plastacele, a cellulose acetate manufactured by E. I. du Pont de Nemours & Co., Inc.; all other colors are Tenite.



DECORATIVE THIRD AWARD

THE RICHARDSON COMPANY, MELROSE PARK, CHICAGO, ILL., IS awarded Third Place in the Decorative Group for its development of Translucent Insurok. The judges specifically state that the award is made to the material and its possibilities of fabrication rather than to the examples submitted in the competition to illustrate uses of the new product.

Translucent Insurok, a laminated product of the Richardson Company, is impregnated with urea resin supplied by the Beetle Products Division of the American Cyanamid Company.

The Photo Mural, approximately three by five feet, which illustrates its use, was designed by the Richardson Co., and was made by placing a photographic enlargement under one surface of transparent impregnated paper in an assembly of sheets. When laminated, the photograph becomes an integral part of the panel, well protected from dirt, wear and abrasion. Illuminated from behind, the light diffusion powers of the laminated material give the photograph a warm real-life glow. The clear transparency of the urea resin permits delicate colors, even colored photographs, to retain their natural brilliance without danger of "yellowing."

Water color drawings, pencil designs, blueprints, charts, theater and advertising signs can be made practically permanent by this process and possess a translucence without fragility, found in no material other than laminated plastics.

HOUSEHOLD

FIRST AWARD

ZENITH RADIO CORPORATION, Chicago, Ill., wins First Award in the Household Group with its Radio Nurse, a definite and important contribution to modern living and of unique design.

Radio Nurse is an adaptation of a one-way short wave radio transmitter and receiver for home or hospital use, which offers protection to children and comfort to the sick. The transmitter, when in operation, brings the slightest sound or spoken request from the nursery, chamber or sickroom to those in other parts of the house where the receiver is installed.

Made of walnut Bakelite, the housing is molded by Kurz-Kasch, Inc., and Chicago Molded Products Corp. It was designed by Isamu Noguchi (Japanese-American sculptor).

SECOND AWARD

MODERN PRODUCTS COMPANY, CHICAGO, ILL., RECEIVES SECOND Award in the Household Group for its patented Clothes Pins and Locks.

The Clothes Pins, with three smooth flexible plastic prongs, are designed for home and travel use. Their firm but gentle grip securely fastens hosiery, lingerie, baby clothes, or any other delicate apparel on the line, with no danger of tearing, snagging or damaging fabrics. The Lock Pins, which have molded rings to attach the cord, make it a simple matter to hang a "line" in the bathroom, kitchen, hotel room or any convenient place, and also help keep the line tight.

Manufactured under U. S. Patents Nos. 2,071,812 and 2,131,162, the Clothes and Lock Pins are made of Tenite and molded by General Electric Company. A. C. Treece, of General Electric Company, is responsible for their design.

HOUSEHOLD THIRD AWARD

MANNING-BOWMAN & COMPANY, MERIDEN, CONN., TAKES THIRD award in the Household Group with its No. 6060 Twin Reversible Waffle Iron. Jay Ackerman and E. A. Farr are jointly responsible for the design.

The Twin Reversible Waffle Iron, which makes two full-size waffles in the same time it takes to make one in the ordinary iron, is entirely automatic. "In developing the design," says Mr. Ackerman, "it was necessary to find a simple means of support for the iron, one that would make it easy to turn and yet hold it securely in position while the batter was being poured. Several materials were considered, but plastics were finally chosen because of their more pleasing appearance, their heat-resisting qualities and their lower cost."

Side supports, handle and knobs on the iron are molded by General Electric Company of Textolite, a phenolic material made by the same company. A flat spot was introduced into the handle and plastic supports to insure an exact horizontal position during the pouring of the batter.

FIRST AWARD

THE UNIVERSAL PLASTICS CORporation, New Brunswick, N. J., is awarded First Place in the Novelty Group with its Transparent Oil Cans designed by Dr. Leo Nast of that company.

These Transparent Oil Cans, available in household and industrial sizes, are outstanding because they show at a glance what their contents are and they never run dry without warning. The cellulose plastic used provides not only transparency, but strength, elasticity and toughness as well. The cans will stand a surprising amount of rough usage without accumulating dents and marred areas. They are not affected by kerosene, gasoline or oil, and keeping the outside neat is a simple chore.

Where several cans are kept handy for different purposes, different transparent colors in which they are supplied may be used to indicate the identity of the contents of each can.

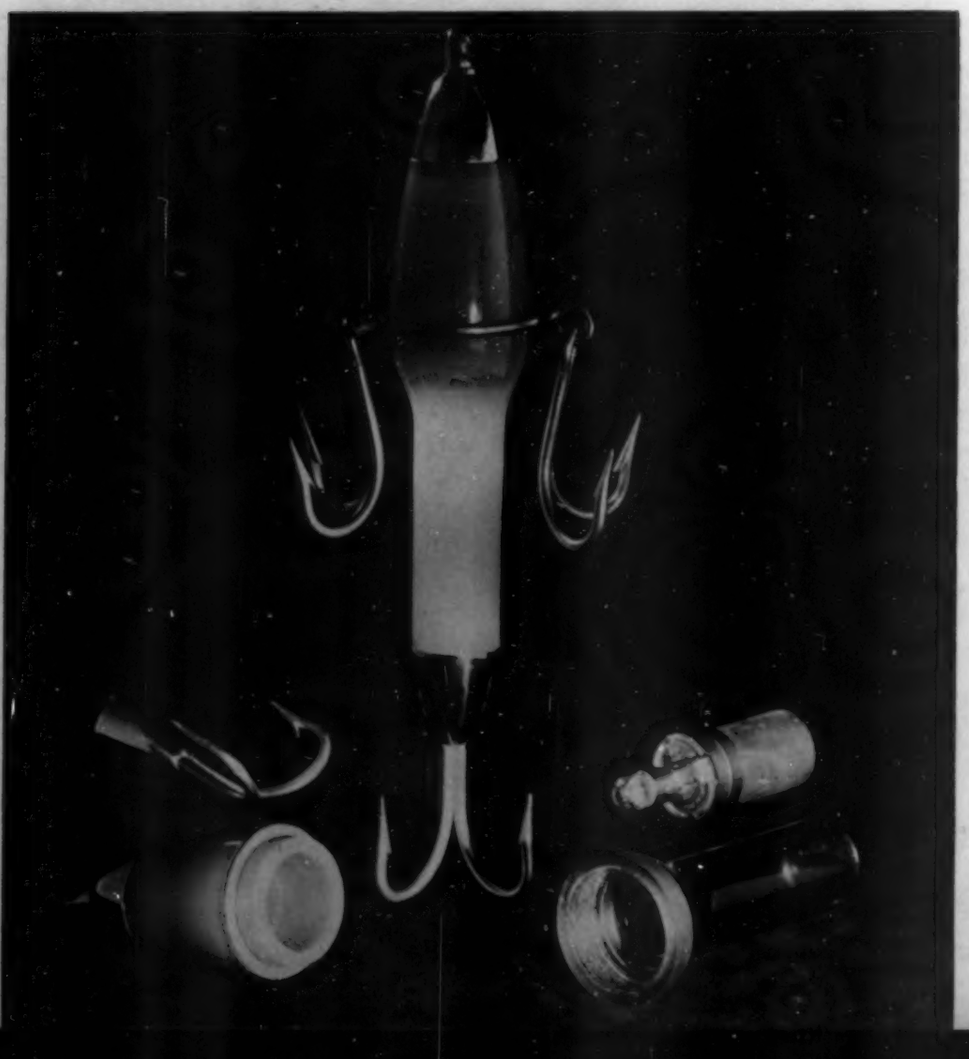
Molded by Universal Plastics Corporation, small sizes are made of Lumarith, a cellulose acetate compound produced by Celluloid Corporation, while larger sizes are fashioned from Monsanto CA.

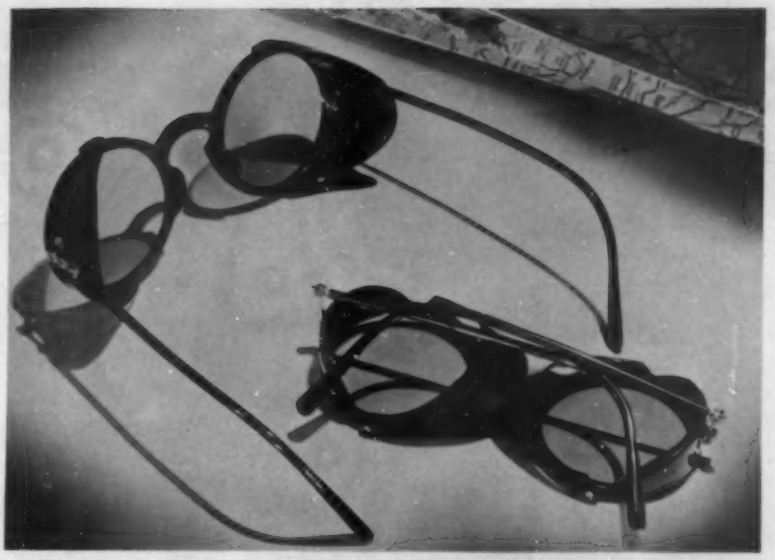
NOVELTY SECOND AWARD

THE SURE-CATCH LURE COMPANY, IRVINGTON, N. J., WINS SECOND Award in the Novelty Group with its Senior Lur-O-Lite, an ingenious illuminated bait lure for deep water fishing.

The fact that fish are generally conceded to be attracted to light prompted the development of the Lur-O-Lite. When the plastic body and head of the lure are screwed together, contact between a small enclosed battery and bulb causes illumination. Once securely fastened together, the body of the lure is watertight.

The two egg-shaped plastic parts of the lure are molded by Boonton Molding Company, of Plastacele. George Beck created its design. After considerable experimentation, cellulose acetate was adopted for the lure because it was the one material found to have an opacity, durability and rigidity which could be counted upon to withstand the corrosive effects of sea water as well as savage attacks of game fish. The use of this plastic material permitted a simplified manufacturing process which makes it possible to sell the lure at a price within the reach of the average fisherman.





NOVELTY THIRD AWARD

THE OPTICAL PRODUCTS CORporation, New York City, receives Third Award in the Novelty Group for its Adjustable Goggle which provides eye protection against dust, sun-glare, wind and rain, and reveals several new and practical features.

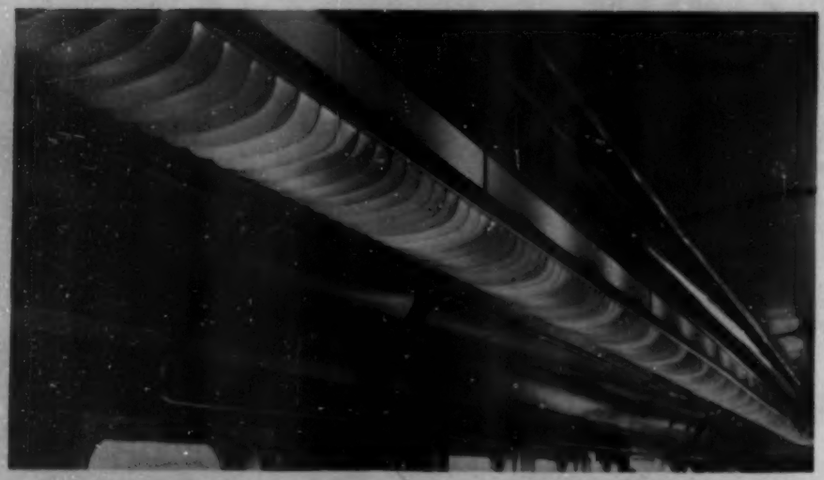
The temples are attached with adjustable hinges which make it possible to properly fit the face and ears of the wearer; collapsible plastic shields eliminate side glare and prevent flying particles of dust from entering the eyes; temples and side shields fold compactly to fit into purse or pocket when the goggle is not in use.

Not only is this goggle recommended for sports, motoring and such, but it also affords efficient protection for railroad engineers and brakemen, as well as any other workmen with outdoor occupations. The frames, designed by L. Grossman, of Optical Products Corp., are made of Monsanto CN, a cellulose nitrate material supplied by the Plastics Division of Monsanto Chemical Co. They are fabricated by Optical Products Corporation.

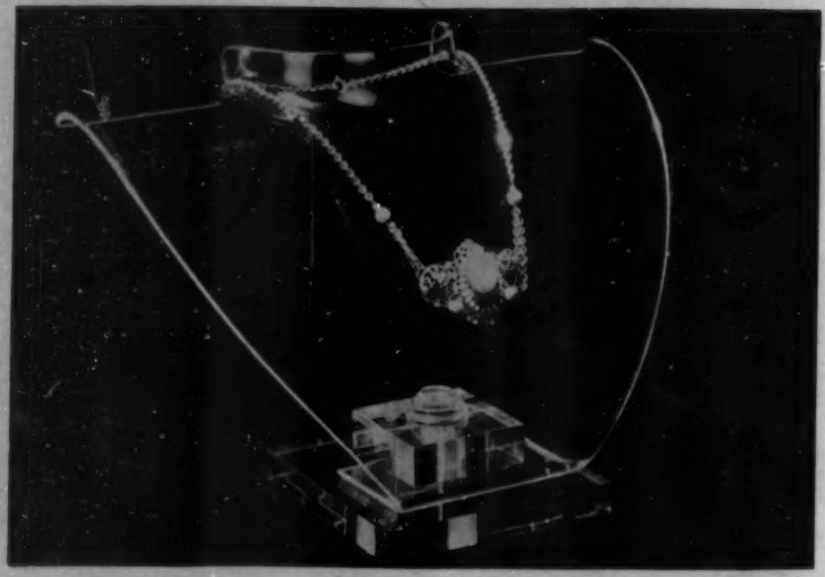
ENTRIES IN THE THIRD ANNUAL MODERN PLASTICS COMPETITION ARE NOW ON DISPLAY AT OUR NEW BUSINESS HOME, 26TH FLOOR, CHANIN BUILDING, 122 EAST 42ND STREET, NEW YORK CITY, WHERE OUR READERS ARE CORDIALLY INVITED TO INSPECT THEM ANY BUSINESS DAY FROM 9 A.M. TO 4 P.M. THESE PHOTOGRAPHS PICTURING THE ENTRIES WERE MADE, HOWEVER, AT OUR FORMER QUARTERS BEFORE WE MOVED.

NO ONE WHO HAS ANY INTEREST IN PLASTIC MATERIALS OR IS CONSIDERING THEIR USE IN ANY OF HIS OWN PRODUCTION PLANS CAN AFFORD TO MISS SEEING THESE OUTSTANDING EXAMPLES OF THE MOLDING, LAMINATING AND FABRICATING ARTS WHICH EMBRACE SIX MAJOR CLASSIFICATIONS: INDUSTRIAL, TRANSPORT, SCIENTIFIC, DECORATIVE, HOUSEHOLD AND NOVELTY. WHY NOT VISIT THIS EXHIBIT BEFORE ITS CLOSING ON DEC. 15?

INDUSTRIAL HONORABLE MENTION



TO ADAMS & WESTLAKE CO., ELKhart, Ind., for continuous louvre Subway Lighting Fixture with supplemental Pier Lights, designed by the company and built by Pressed Steel Car Co. White louvres and pier light bowls are molded of Plaskon by the Plastics Department of General Electric Co. Translucent side panels are of Insurok, laminated by Richardson Co. with phenolic resin supplied by Catalin Corp., and urea resin supplied by Beetle Products Division of American Cyanamid Company.



TO BULLOCK'S, INC., LOS ANGELES, Calif., for Jewelry Display Stand designed by Lawatch, Ltd., and fabricated by Dave Swedlow from Plexiglas, a cast acrylic resin made by Röhm & Haas Co. This stand, which forms a fitting background for any type of jewelry no matter how fine or expensive, suggests an unbreakable display medium that will help eliminate fixture-heavy windows, counters and display cases.

TO MINE SAFETY APPLIANCES Co., Pittsburgh, Pa., for Explosives Carrier designed by its Research Department and company molded of special impact resistant Bakelite. The tough, moisture-proof, dielectric plastic shell and sealed-tight cover, when in use, makes this a safer, stronger, more convenient means of carrying high explosives.

TRANSPORT HONORABLE MENTION

TO SEALED POWER CORPORATION, Muskegon, Mich., for its Piston Ring Expander Display, designed and fabricated by Colonial Kolonite Co. from Prystal, a clear cast phenolic material made and cast by Catalin Corp. The cast phenolic type of plastics makes possible this transparent, unbreakable display which is used on counters in automobile accessory and repair shops to illustrate the action of expansion springs, showing exactly how they keep the piston rings firm against the cylinder.

TO RALPH N. BRODIE CO., INC., Oakland, Calif., for the new Brodimatic Counter Housing designed by William F. Berck of that company. Molded by Hahn Plastic & Die Cast Corp., the housing is of Tenite. It is reported that a reduction of four pounds, over the previous meter, was made possible by using plastics for the new housing, and longer life of the instrument was obtained.

TO ANDER-BAR MFG. CO., Sparta, Wisconsin, for "Westlite" Driving Lamp Shell designed by H. H. Bartels. The shell, injection molded by Thermo-Plastics, Inc., is made from both Lumarith and Tenite. Tests have proved that these lamps with plastic shells withstand greater abuse than does metal. They can be made absolutely watertight and dustproof, and cannot rust or corrode.

SCIENTIFIC HONORABLE MENTION

TO F. B. REDINGTON CO., CHICAGO, Ill., for Counter Wheel designed and double injection molded by Gits Molding Corp., of Tenite. The black wheel with letter-shaped holes is injection molded first; then a second injection fills in the letter spaces with white. These white letters become an integral part of the wheel and cannot wear through.

TO PRECISION SCIENTIFIC CO., Chicago, Ill., for "Stop-Watch-Man," designed by Barnes & Reinecke. Chicago Molded Products Corporation molded this application of Bakelite. The use of plastics in this instance resulted in a better-looking, better-functioning product which can be sold at a substantially lower price than the previous model made of cast metal.

TO THE DR. SCHIER CO., NEW York City, for Earpiece molded of Lucite. These earpieces are individually designed and molded for each patient by Dr. Mayer B. A. Schier, using special technique and equipment developed by him after a year of experimentation. Earpieces molded from this plastic material are, among other things, clean and stable of finish, unbreakable, light weight and comfortable to use, and unaffected by natural ear secretions.

DECORATIVE HONORABLE MENTION

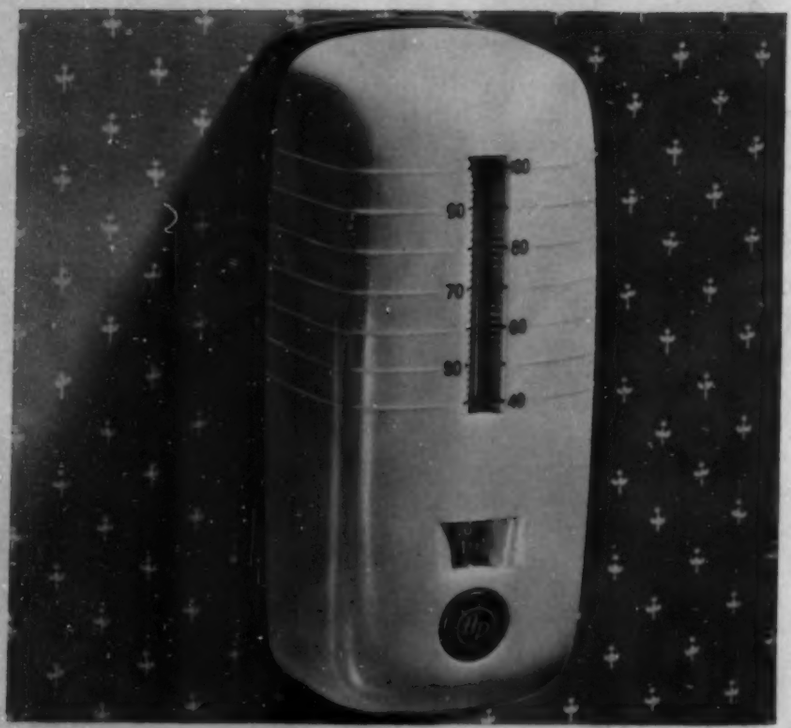
TO EMERSON RADIO & PHONOgraph Corporation, New York City, for its company designed College Radios. The cabinets, fabricated by Ortho Plastic Novelties, Inc., are made of Monsanto CP, a cast phenolic resin produced by the Plastics Division of Monsanto Chemical Co. Grilles and knobs, injection molded by Foster Grant Co., are of Monsanto CA. The combinations of colors used in these radios carry a special appeal for college students.

TO C. K. CASTAING STUDIO, STONY Brook, L. I., for Seal Bookends designed by Mr. Castaing. Formed from Resinoid, a cast phenolic resin made by Bakelite Corporation, these were cast in a rubber mold supplied by C. K. Castaing and hand finished by him. The two seals came from the same mold but different finishes give the appearance of two pieces of sculpture carved from two entirely different materials.

TO C. K. CASTAING STUDIO, STONY Brook, L. I., for Relish Dish in Cucumber Tree Leaf pattern, designed and handcarved by Mr. Castaing, from Plexiglas. This particular plastic was chosen for the application because it can be bent and shaped from sheet stock into articles desired in limited quantities, not warranting the expense of dies; because it is amenable to engraving, practically unbreakable, and easily cleaned; and because it is available in transparent colors.

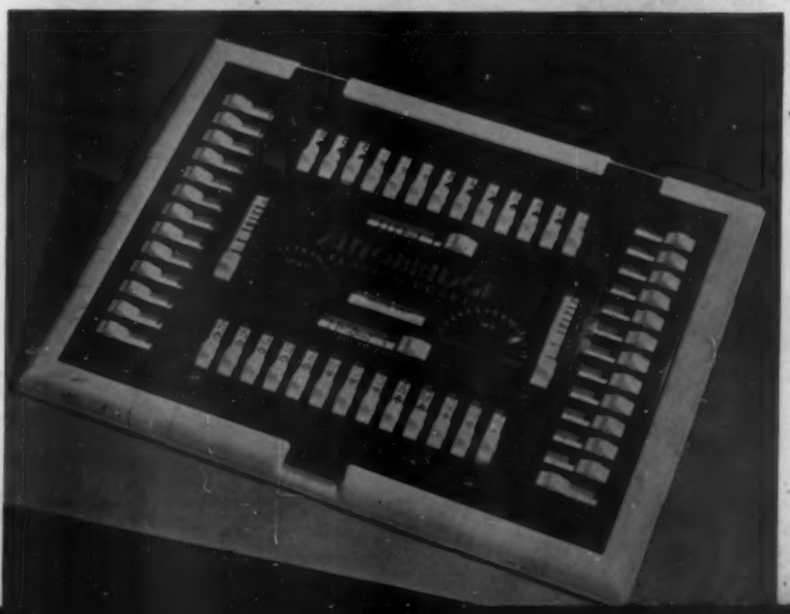
HOUSEHOLD HONORABLE MENTION

TO SEARS, ROEBUCK & CO., CHIcago, Ill., for its Carafe, designed by John R. Morgan of the same company. The three plastic parts making up the assembly are molded of Bakelite polystyrene by the Cardinal Corporation. This application represents a combination of plastics and metal in which one material complements the other, intensifying the beauty of both.



TO AUTOMATIC PRODUCTS CO., Milwaukee, Wisconsin, for A-P Thermostat, designed by Barnes & Reinecke. The housing with brown brushed-in numerals is Tenite. The base, base plate and temperature control wheel are gold-brown Bakelite with ivory numerals brushed into the wheel. The plastic parts were molded by Chicago Die Mold Mfg. Corporation.

TO STEAMPOINT ELECTRIC CO., New York City, for its Electric Steam Iron. Designed by A. & E. Tricomi, the handle is molded of Bakelite by H. Jamison. The knobs are molded by Accurate Molding Corp. Plastics were chosen for this unit, consisting of handle and switch control formed in a split mold, because they provide complete insulation to electrical controls, are moisture resistant, easily assembled, modern in appearance and comfortable to the touch in use.



NOVELTY HONORABLE MENTION

TO DEAUVILLE BAGS, INC., NEW York City, for its Bag with Clear Plastic Frame. The plastic frame, fabricated by Ortho Plastic Novelties, Inc., from a design originated by Oscar Gold of the same company, is made of Lucite. Intricately carved, this bag top has the sparkle and brilliance of natural crystal, yet weighs only about one-third as much and is far less fragile.

TO LOUISESANDERS, NEW YORK City, for ensemble of Hat, Bag and Belt, designed by Miss Sanders. The hat, made by Miss Sanders and the bag and belt, made by Virginia Art Goods Studios, Inc., are fashioned from sheets of Parkwood, a laminated woven wood veneer made by Parkwood Corporation, impregnated with clear, cellulose acetate developed by du Pont. Impervious to rain and climatic changes, flexible Parkwood is an effective material for warm weather wear.

TO AUTOBRIDGE, INC., NEW YORK City, for its Molded Autobridge Board, designed by Earl Mandle. Molded by Plastics Department of General Electric Co., the top is Textolite; the base is Plaskon; and the injection molded top slides are Monsanto CA. The slides are sufficiently resilient to grip the grooves and will not slip of their own accord when the board is held in a tilted position.

1

2

PHOTOS COURTESY MICARTA

Both power and lubrication costs drop when laminated phenolic bearings (Fig. 1) are installed and even in this 16-in. strip rolling mill (Fig. 2) they outlast metal despite the shocks and wear they must stand in twenty-four hour a day service. Made of canvas impregnated with phenolic resin they are pressed or laminated into a homogeneous mass, then machined to shape

LAMINATED PHENOLICS GET AROUND

by A. B. THOMANDER*

Tough durable laminates stand hard wear and shocks in radio, on ship board, in steel mills

LAMINATED PHENOLICS HAVE TAKEN THEIR place quietly but surely in industrial plants earning every inch of their progress and acceptance by demonstrating their ability to do a better job than the materials they replace. For some time now, steel mills have minimized bearing trouble by replacing with phenolic laminates all types of roll neck bearings previously used. In actual usage these bearings have proved their ability to resist the pressure and pounding that permanently deforms other materials. Their resistance to wear, swelling, warping, or shrinking, together with being unaffected by oil, grease, acids, or alkalis in impure water provides longer bearing life.

Because water lubrication is its ideal, the cost of oil or grease is "out" in the beginning. Another of the money-saving inherent qualities of the bearings is its low coefficient of friction. That accounts for the low power consumption. Among the installations of these bearings is that of a 16-inch hot strip mill. They have been in use for 1000 hours and show practically no wear as compared with the 32-hour life of the metal bearings they replaced.

From a bar mill in Alabama it is reported that phenolic bearings have been in service for 400,000 tons of rolled metal. The greatest service record for metal bearings previously used on the same rod mill was 15,000 tons. In a plant operating continuous rod mills and billet mills, a careful check under controlled conditions, revealed that 50 percent more power was required with brass bearings than with phenolic bearings. According to the mill superintendent the saving amounted to $80,000.00 per year.

Another mill reports a 35 percent average saving in power, based on a three-year period comparing with brass and babbitt bearings. Still another mill reports an annual saving of $5000.00 because of the elimination of grease. From a hot strip mill it has been reported that after two years of experience with this type of bearings the mill has never been shut down because of a hot neck.

Because phenolic bearings are adapted to a water lubricant, they are naturally suitable for bearing surfaces which are exposed to or submerged in water. Guide bearings for vertical waterwheels, often are rather inaccessible and to lubricate them with oil or grease and expect the lubricant to "stay put" is a double problem. Lignum vitae has been used in such service in favor of metal because water is a satisfactory lubricant for such wood. Similarly lignum vitae has

* Micarta Division, Westinghouse Electric & Manufacturing Co.

been used with a certain amount of success in the marine industry for tail-shaft (stern tube) bearings, and rudder pintel (gudgeon) bushings.

In addition to being adaptive to water, laminated phenolic offers salient advantages over lignum vitae such as:

1. Lower coefficient of friction
2. Longer life
3. More uniform in density
4. Can be stored indefinitely in any atmospheric condition without danger of shrinking, swelling, or cracking.

In November 1933 the Isthmian Steamship Company installed on the S.S. Steel Exporter, the first large ocean-going laminated tail-shaft bearing. About a year later the S.S. Steel Exporter picked up a steel cable that so seriously damaged the tail shaft that it had to be replaced by the one now in service. The bearing, however, was left in place. In February 1937 the new shaft was drawn for the regular inspection by the American Bureau and the bearing was found to be in excellent condition. The wear on the bearing at the after end was $^3/_{32}$ of an inch. The bronze shaft liner was in good condition.

When the S.S. Steel Exporter was drydocked in Brooklyn in January 1938, plans to draw the tail shaft were cancelled when it was found that the total wear in the bearing was but $^4/_{32}$ of an inch. Considering the fact that two shafts had to wear into "fit," this wear was small. For large shafts the block type or "stove" bearings are used.

Laminated phenolic, in its early history, was usually thought of as an electrical insulator. But soon it was recognized also as the answer to many mechanical applications—bearings, thrust blocks, bushings, gears, paper mill suction box covers, doctor blades, piston rings, valves, valve seats, airplane pulleys, fan blades, rayon spinning buckets, miners' helmets, and later, decorative table top veneer and wall paneling of unlimited designs, patterns, and shades.

Important applications where dielectric strength is essential are in the field of radio. Here mechanical strength is important but secondary to dielectric strength. Little punchings of various intricate shapes must possess the combined characteristics of low power factor losses with ability to maintain that quality even under high temperature or high humidity conditions, and must have easy and smooth punchability and good machinability. Such radio insulation (*Please turn to page 194*)

3

4

3. Close-up of a Micarta marine tail-shaft bearing. 4. The versatility of this material is shown by these radio parts of laminated tubing, punched, drilled and threaded with micrometric accuracy. 5. An assortment of small essential radio fittings. 6. Metal conductors may be combined with laminate for terminals and connectors (Photos courtesy Westinghouse Electric & Mfg. Co.)

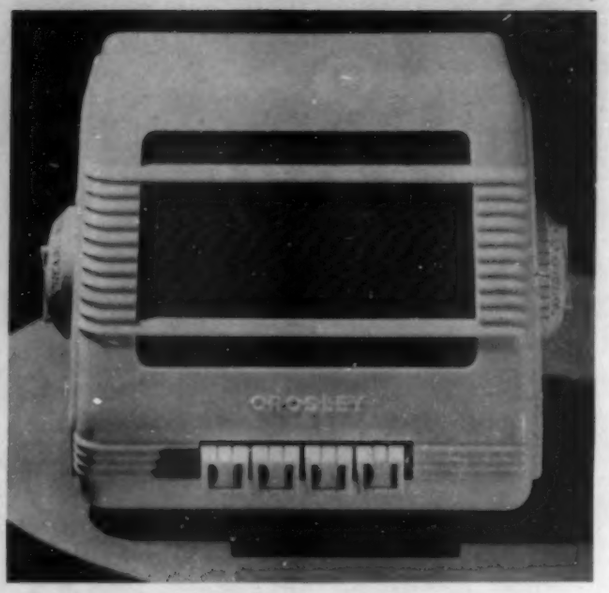
5

6

NEW TYPE MIDGET

For years, reduction of the size of table radios has been complicated by the fact that both dial and speaker, of substantial size, had to be placed on the front of the cabinet. Now that pushbutton tuning eliminates the dial, the entire front can be devoted to the speaker.

This is exactly what Crosley has done in the new automatic tuning model shown here. The one-piece cabinet—molded of Plaskon*—has a slot below the grille for the tuning buttons, with the auxiliary manual tuner and volume control on either side in the form of flat dials, also molded of Plaskon. Thus the designer achieved unusual compactness with no sacrifice of baffle-area. Firestone Rubber & Latex Prod. Co. is the molder.



PLASKON

HIGH SPEED SHAVING

Enter the Rand—produced by the General Shaver Division of Remington-Rand, Inc. Built on a new principle, and housed in a smooth ivory Plaskon case, the new Rand Shaver is destined to be a very important factor in the shaver field.

Among the features of the new Rand are a motor with no rotating parts—a motor that defies wear, needs no oiling and cannot produce any radio interference. The cutting head, identical to the high-priced Remington-Rand shavers, operates at an extremely high speed.

A graceful, easy-to-hold shape is used for the housing, and the ivory Plaskon surface is perfectly smooth. Wear, perspiration and abrasion cannot damage its lustrous surface. Molded by Specialty Insulation Mfg. Co.

PLASKON
2121 SYLVAN AVE.
CANADIAN AGENT CANADIAN

* *Reg. U. S. Pat off.*

VANITY BY BOURJOIS

One of the most attractive compacts ever molded of plastics is this new Bourjois Single Loose-Powder Vanity made by Scovill Mfg. Co. It's a happy combination of rich blue Plaskon and bright engraved chromium-plated parts.

Almost everything about this Bourjois vanity—design, construction and assembly—is somewhat unusual. A heavy-walled Plaskon body, with rounded corners to fit the hand, is accurately undercut to permit snug assembly of the thirteen metal parts. The body is molded in a deep ultramarine Plaskon blue, contrasts beautifully with the chrome-plated metal, and assures the compact a long life.

Molded parts are by the General Electric Co. and Molding Corporation of America.

MOLDED COLOR

DISINFECTANT HOUSING

Here's an application where Strength is the thing. It's a new housing for Rochester Germicide Company's Sanor, a disinfectant device for public rest-rooms.

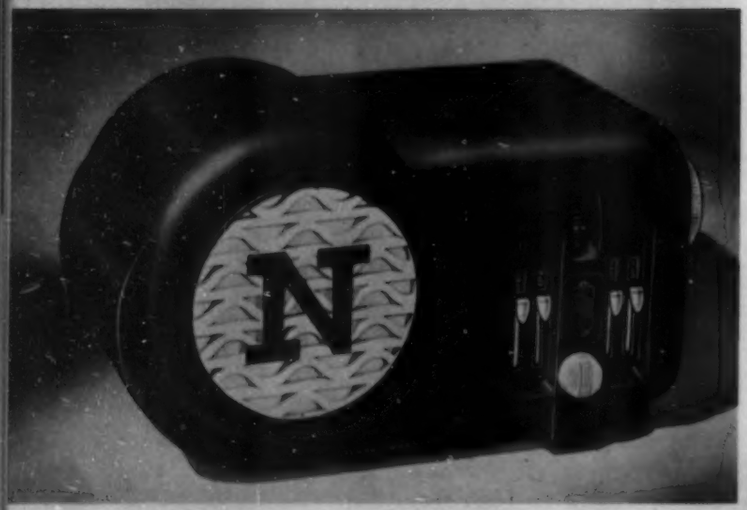
Metal stampings have been used for housings like this for years because of strength requirements —even though rusting and chipping of finish was inevitable. Now, however, white Plaskon and clever design have been combined to produce an extremely attractive and durable housing—one that will withstand rough handling by service-men, and that will not peel, dent, stain or corrode during years of service.

The new housing is over a foot long, has a sanitary look and simplicity that fits into the smartest rest-rooms. Norton Laboratories mold it.

COMPANY INCORPORATED
TOLEDO, OHIO
INDUSTRIES LTD., MONTREAL, P.Q.

COLLEGE COLORS

We hate to tell you—but they are only *PAINTED*



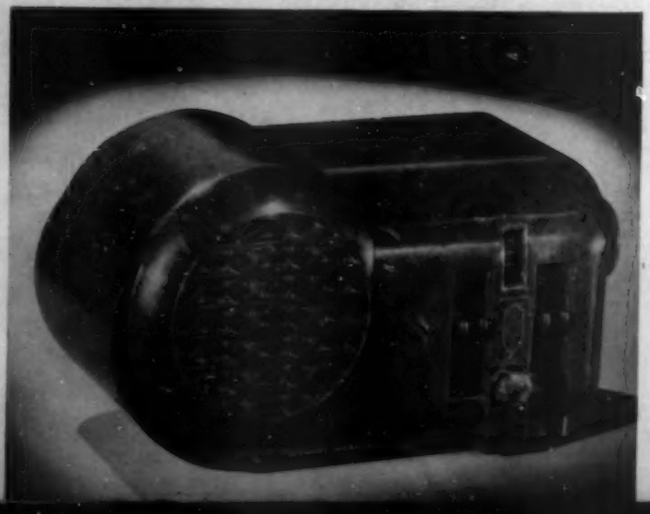
Lyon and Healy's in Chicago (top) pulled quick returns from loyal collegians who couldn't resist a radio in their own school colors. Meet the Varsity (bottom), a painted-up and bedizened number which gets easy entry into fraternities and dormitories throughout the land. They make 'em in natural colors too, as you can see at the right—mottled brown Bakelite and white Plaskon

COLLEGE COLORS CAPTURE CUSTOMERS, SAYS Stewart-Warner, and trots out its smooth new "Varsity" radio to prove it. For college and university colors, sprayed and baked to slick perfection over the molded cabinets of the Barnes-&-Reinecke-Designed "Varsity" radio, promise to capture more college customers this fall than you can shake a drum-major's stick at.

The story goes that back during the July heat wave (which probably accounts for the notion of painting the molded cabinets) Stewart-Warner's radio manager, L. L. Kelsey, had the Idea. "Close to a million students in 1,166 U. S. Halls of higher learning," mused Mr. Kelsey, "are all potential owners of good, inexpensive radios." The student, he reasoned, acts like any other consumer when buying a radio, and like any other consumer the student will jump at the chance to own a radio which is somehow identified with his ruling interest in life, providing such identification can be made.

Acting on this premise, the S-W radiomen went into a huddle, came up calling signals for the new "Varsity," a five (including ballast) tube superhet, with the sprayed and baked colors absolutely authentic and with the institution's initial completing the identification. In addition, fraternity or personal initials may be had to further personalize the set. Northwestern, for instance, is represented by a radio with purple cabinet, white dial control knobs and push buttons, and white grill with a purple "N" thereon. For local consumption the Varsity is rechristened the "Wildcat," "Illini" or "Maroon" as the case may be. Rumors that certain heavily footballed schools are using the insignia "$" are absolutely without foundation of fact.

An estimate of the potential volume for the Varsity can be had from Texas Christian's preliminary order—to take one at random—105 sets in royal purple and white, with initials 'n everything. And that, as the Sales Department points out, was a preliminary, before-school-starts order, and they suggest that you multiply 105 radios by 1,166 colleges to figure the sales possibilities on colleges alone. They further (*Please turn to page 102*)



PHOTOS COURTESY BUREZ

The smart Silex ensemble above, using nine parts of molded plastics, has been a sales leader since its inception. The phenolic handle on the Corning Glass Company's brewer (center) won't burn the hand that lifts it. The Vaculator, by Hill-Shaw Company (right) uses a plastic handle on the upper bowl, a hinged cover for the lower, and four other molded parts as well

MAKE MINE BLACK!

by H. S. SPENCER*

Coffee drinkers will like these new brewers with comfortable plastic grips

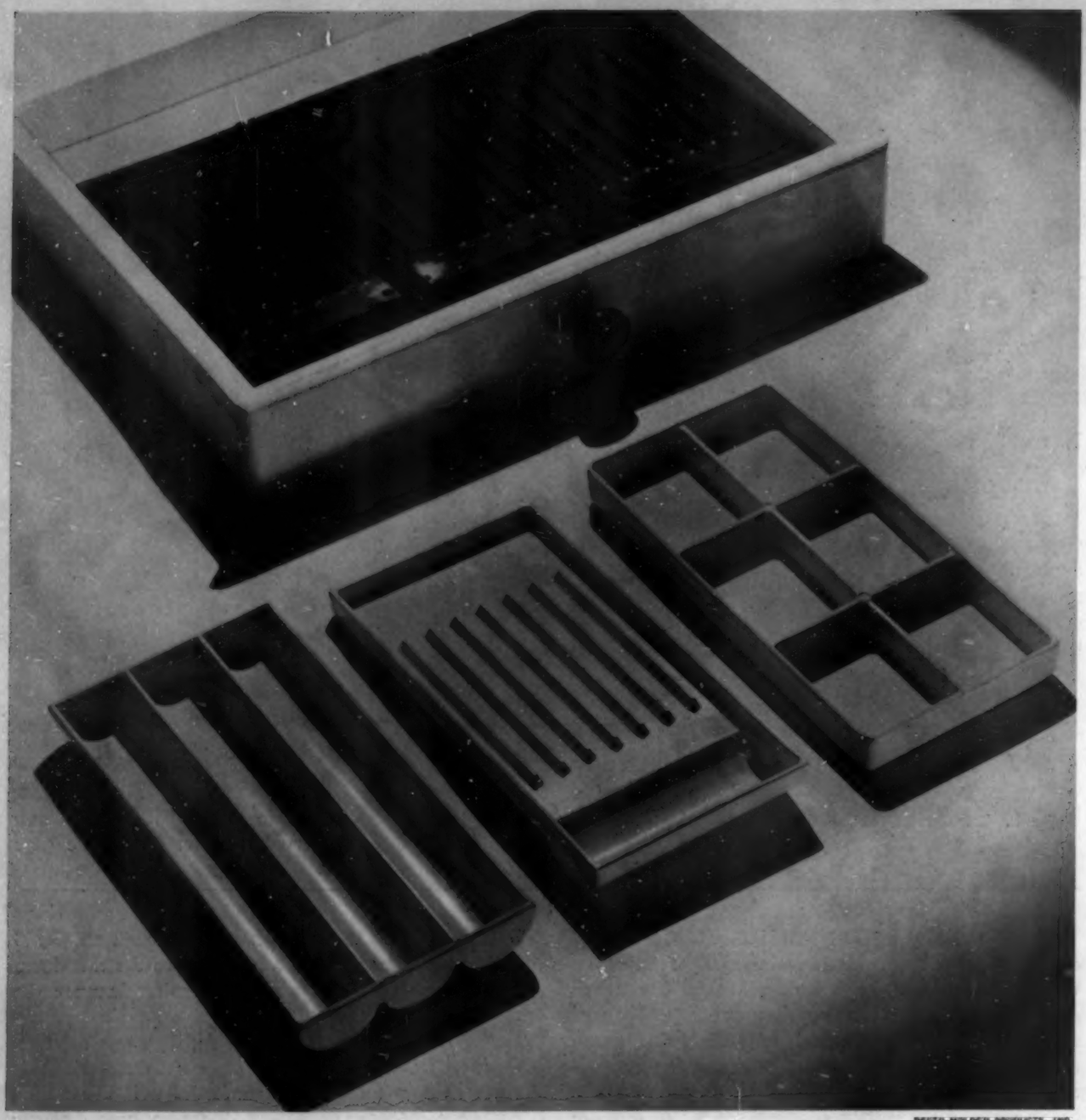
THERE'S ALWAYS THE POSSIBILITY OF COINcidence when an upward swing on the sales chart occurs within a short time after a design change. But, when there is a consistent increase close upon the heels of each change, it is only reasonable to assume that design may be a definite cause. To say that plastic parts promote sales of glass coffee brewers may sound like a broad statement. However, when present models are considered, and a case history of one model of a pioneer manufacturer is examined, excellent proof for that statement is readily found.

Not many years ago the first glass coffee brewer made its appearance. The idea took. One model consisted of an upper and lower glass bowl, a metal collar and metal handle attached to the lower bowl—no plastic parts at all. Today, the complete ensemble of brewer base, handles, collars, neckbands, covers, trays, creamer and sugar are plastic.

However, the adaptation of plastics did not take place in one broad step. Instead, as each plastic part was added one finds logical reasons for its adoption. Consider the case history of one of the pioneer models: Experience soon proved that the heat transfer from the bottom bowl to the metal handle, through the metal collar was excessive. In an attempt to cut this down engineers decided to try a plastic collar between the metal collar and the bowl. The success of this application quickly proved the small added cost worth while. Salesmen had a new talking point—sales went up. This success led to another change the following year. To bring the brewer to the table without hot pads, a plastic plate was placed beneath the stove, another good selling point. Non-heat conducting property of the plastic prevented damage to table tops. So, one finds in the short space of two years, the handicap of heat transfer was eliminated by the use of plastics.

This led almost naturally to consideration of heat radiation. How could these brewers be changed to lessen this effect? The answer was found in a plastic handle. Plastic handles will not absorb heat readily; neither will they hold it. Plastics present no production finishing problem. The color is an integral part of the piece, will not wear off, is not easily damaged by handling, boiling, washing or cleaning. What's more, it has been learned that the cost of these plastic parts, because of increased sales and production, are no greater than the original parts made (*Please turn to page 94*)

*General Plastics, Inc.



RECTO MOLDED PRODUCTS, INC.

A BURR • A DRILL • A DISK

DENTISTS LIKE THESE MOLDED PLASTIC TRAYS because they do not chip as easily as those of glass which have been in common use for some twenty-odd years. They like them too, because they fit securely into standard cabinet drawers, tilt at just the right angle to make all instruments quickly accessible.

Whether a burr, a drill or a cutting disk is the next operating instrument to be chosen, it is easily reached in its own compartment which is flat or rounded at the bottom as custom demands. There are three types of trays, four by eight inches, as you can see: One is divided in six parts for burrs, disks and such; another has three parallel troughs for strips, etc.; while the tray in the center is reserved for those disagreeable but necessary implements which the shape suggests. You name 'em, we don't even like to think about them.

The point is: the plastic trays whether black (phenolic) or white (urea) are sanitary and easy to keep clean. They are distributed by Rubenstein Dental Equipment Company.

STOCK MOLDS

SHEET SIXTY-FIVE

A group of molded trophy bases to which figurettes or other designs may be attached by means of a hole molded in the top of each. Available without mold cost from stock molds. When requesting samples interested executives should write on company letterhead

832. Top diameter 4 5/16 in.; base 5 3/4 in.; 3 in. high

833. 5 1/8 in. top diameter; 6 3/4 in. at the base; and 3 1/12 in. high

834. Top diameter 5 7/8 in.; base 7 5/8 in.; 4 in. high

835. Diameter at top, 6 3/8 in.; at base, 8 1/4 in.; height 4 5/16 in.

836. Top diameter 2 5/8 in.; base diameter 3 5/8 in.; height 1 7/8 in.

837. Top diameter 3 in.; base is 4 in. diameter and 2 in. high

838. 3 9/16 in. diameter across the top; 4 3/4 in. at the base; and 2 3/8 in. in height

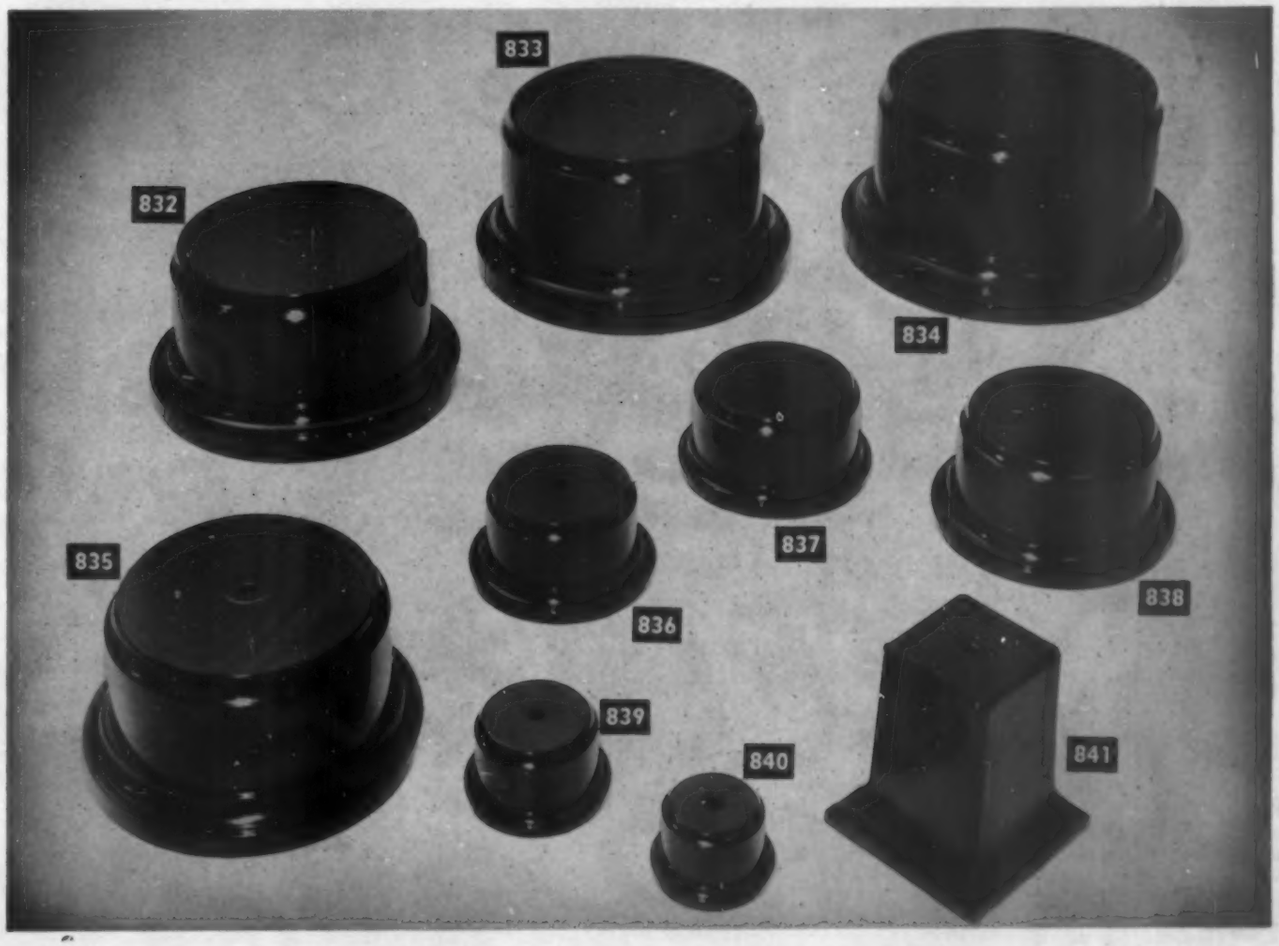
839. Top diameter, 1 7/8 in.; base diameter, 2 1/2 in., height 1 7/16 in.

840. 1 7/16 in. at the top; 2 in. at the base; and 1 1/4 in. high

841. A square trophy base 1 23/32 in. square at the top; 3 1/16 in. square at the bottom; and 3 9/16 in. high

Address all inquiries to Stock Mold Department, Modern Plastics, Chanin Building, N. Y. C. All molders are invited to send samples from stock molds to appear on this page as space permits

Reprints of sheets One to Fifty-Two—in book form, 25c in coin or stamps



STOCK MOLDS

SHEET SIXTY-SIX

Kitchen and restaurant accessories are available as premiums or for direct purchase from stock molds. Please use company letterhead in requesting samples

---

719. Condiment set which fits a metal stand. Holes on shakers in various sizes. Threaded bases are removable for filling. 2 in. diameter at bottom with 3 1/2 in. overall height

720. Molded sugar dispenser for restaurant or kitchen. 2 5/8 in. diameter, 4 3/4 in. deep inside and 5 5/8 in. overall height

721. Toast dish cover with opening at top for easy lifting, 6 1/4 in. diameter and 2 3/8 in. deep inside

722. Threaded sugar dispenser cap 2 in. in diameter

723. Coasters 2 7/8 in. diameter. Raised edge keeps glass in place

724. Butter chip 2 1/8 in. inside diameter

725. Cream container 1 1/4 in. diameter, 1 1/2 in. high

726. Salt and pepper shakers similar to 719 only 1 5/8 in. in diameter by 3 in. high

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Reprints of sheets One to Fifty-Two—in book form, 25c in coin or stamps

SYNTHETIC SUBSTANCES WITH RUBBERLIKE PROPERTIES*

by E. R. BRIDGWATER**

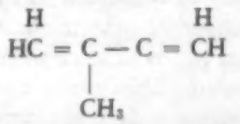
The rubberlike synthetics have little in common except the ability to stretch to several times their initial length before breaking. The properties of these synthetic materials may be varied over a wide range by compounding with other ingredients. Such terms as "oil resistance," "elasticity," "abrasion resistance," etc., are devoid of exact meaning and should be defined in terms of the testing method or service conditions before attempting to draw conclusions. General statements, always unsafe, are therefore especially hazardous in this field.

ALTHOUGH SYNTHETIC PRODUCTS HAVING some of the properties of rubber have been known for many years, their large-scale commercial development dates only from the beginning of the current decade. Today, a great profusion of more or less rubberlike synthetic products is available to the engineering profession—a profusion that must be confusing to engineers who have not had an opportunity or occasion to make a careful survey of the field. The confusion is heightened by the tendency of many who are engaged in promoting products or ideas to draw broad generalizations in terms that are devoid of exact meaning. Engineers who pride themselves on accuracy of thought and expression may state "synthetic rubber is more oil resistant than natural rubber" and fail to recognize the statement as quite meaningless because (1) the term "synthetic rubber" is used in a loose and inaccurate sense and no one knows how broad its connotation may be and (2) the term "oil resistance" is equally indefinite. In order to promote clear thinking, let us first consider the meaning of the term "synthetic rubber" and of the term "rubberlike properties" which appears in the title of this paper.

Strictly speaking, there is no commercial product that can be called synthetic rubber because, if we follow the accepted usage of the past, synthetic rubber would be a product substantially identical with natural rubber in chemical structure and physical properties. For example, synthetic camphor is so called because it is camphor and differs from natural camphor only in that it is made by a synthetic process rather than extracted from a tree. The principal uses for camphor are for plasticizing pyroxylin and as a medicant for the relief of common colds. A new plasticizer for pyroxylin or medicinal agent for the relief of colds may be discovered which resembles camphor in some respects but has certain properties which appear to make it superior for one of these uses. But such a new product would hardly be called synthetic camphor.

The term "synthetic substances with rubberlike properties" might be defined to include only substances that resemble rubber in all its important properties, but such a definition would exclude certain products which resemble rubber at least in extensibility and are of commercial importance. We shall therefore consider the term to mean substances that resemble rubber in the single property of extensibility or deformability under moderate loads, coupled with a tendency to recover their original form when the load is removed, although not necessarily to a degree comparable to the recovery exhibited by natural rubber.

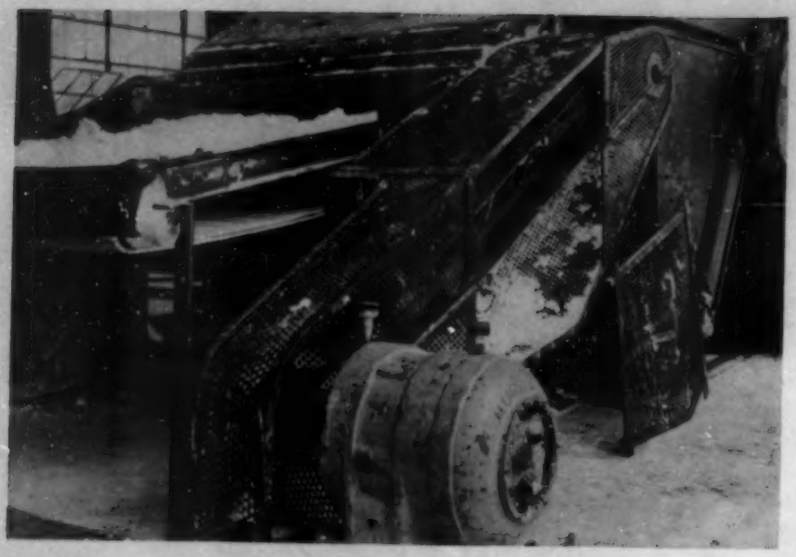
Synthetic products that are rubberlike in this broad sense fall into two broad groups: (1) those that resemble rubber in chemical structure and (2) those that do not. The chemistry of the first group has been admirably presented by Whitby and Katz[1] in an article entitled "Synthetic Rubber." Summarizing briefly, rubber is a polymer of beta-methyl-butadiene (Isoprene),



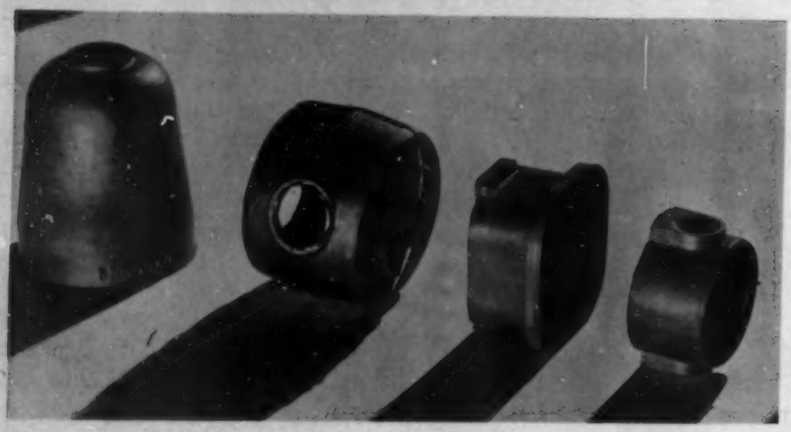
If the methyl group (CH_3) is replaced by a hydrogen atom (H), we have butadiene. If it is replaced by a chlorine atom (Cl), we have chloroprene. Polymerized butadiene, with or without the addition of modifying

* Paper presented before the Process Industries Division, The American Society of Mechanical Engineers, at its recent meeting in Providence, R. I., and published here with the permission of the Society.

** E. I. du Pont de Nemours & Co.



Transmission belts bonded with Neoprene give superior service when the belt is exposed to the fumes of nitric acid, like this one, or to the fumes or splashing of other chemicals and oil, all forces which rapidly deteriorate some rubber belting



Four of the more than forty different Neoprene parts used on 1938 cars because it preserves its rubberlike properties even after exposure to oils, chemicals, heat and ozone. Left to right they are: motor brake cylinder dust seal, steering tie rod and boot, timing inspection hole seal in flywheel housing, and gear shift lever fulcrum ball insulator

agents, is made in Germany. Polymerized chloroprene is made in the United States and is known generically as neoprene. Vulcanized neoprene products are also sold under a hundred or more trade names, each identifying the product of a certain manufacturer, but usually failing to identify it as neoprene. These materials, polymerized butadiene and polymerized chloroprene, resemble rubber quite closely, as might be expected from the fact that their progenitors possess the same chemical structure as isoprene, although in each case a substitution has been made in one of the chemical building blocks. Like rubber, they are vulcanizable; that is, when heated under proper conditions they become much less plastic, more elastic and less susceptible to changes in properties with changes in temperature. After vulcanization they cannot be remolded to another shape because of their loss of plasticity.

The other group of rubberlike synthetics consists of products whose chemical structure bears no resemblance to that of rubber, but which, nevertheless, share some of its properties. In this group are (1) the plastic glyptal resins,[1] condensation products of a polybasic acid, such as phthalic or adipic, with a polyhydric alcohol, such as glycerin or ethylene glycol; (2) the alkylene sulfides,[2] made by condensing ethylene dichloride or other dihalides with an alkaline polysulfide; (3) polyvinyl alcohol,[4] and (4) plasticized polyvinyl resin.[5] These products, and many other plastics which have never outgrown the test-tube stage, have the rubberlike property of extensibility or deformability under relatively light loads. Certain of these products, especially the alkylene polysulfides, are vulcanizable in a limited sense of the word; that is, they become less plastic and more elastic when heated, although after "vulcanization" they are still definitely thermoplastic and, under proper conditions, capable of being remolded to other forms. Others, such as the plasticized polyvinyl resins, are definitely non-vulcanizable and can be hot-molded and remolded without altering their properties.

Physical properties

The properties of vulcanized products derived from polychloroprene[6] and polymerized butadiene[7] have been described in numerous articles and pamphlets published or inspired by the manufacturers of those products. Likewise, the properties of certain compositions derived from the alkylene polysulfides,[8] from the plasticized polyvinyl resins[9] and from the glyptal resins[10] have been made available by the manufacturers for the benefit of prospective consumers in various lines of industry.

It is difficult to compare the properties of the vulcanizable polymers of butadiene and of chloroprene with

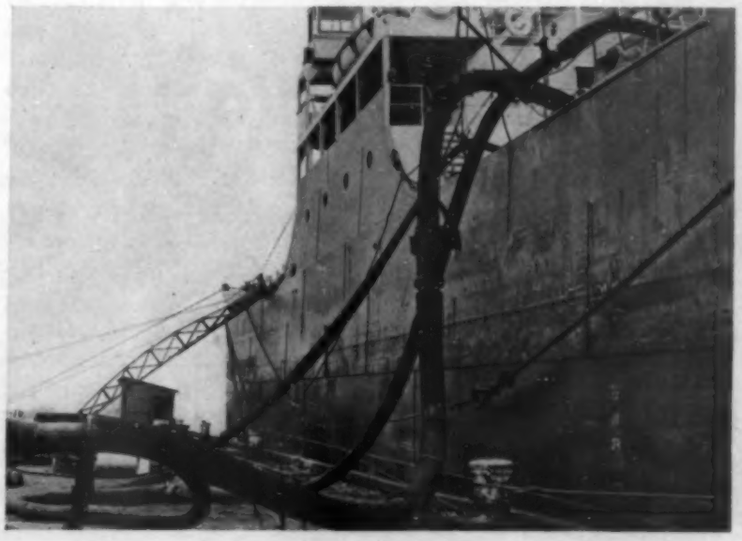
those of rubber because the vulcanized products made from them have a very wide range of properties depending upon the kind and amount of other ingredients that are mixed with them, conditions of vulcanization, etc. This difficulty becomes an impossibility when we broaden the field to include the thermoplastic rubberlike materials which are comparable with rubber and with the vulcanizable synthetics only over a narrow temperature range and with respect to only a limited number of physical properties. Although any attempt at direct comparison of these materials would be misleading, it should be helpful to consider methods of evaluation and the significance of some of the terms commonly used in reporting their properties.

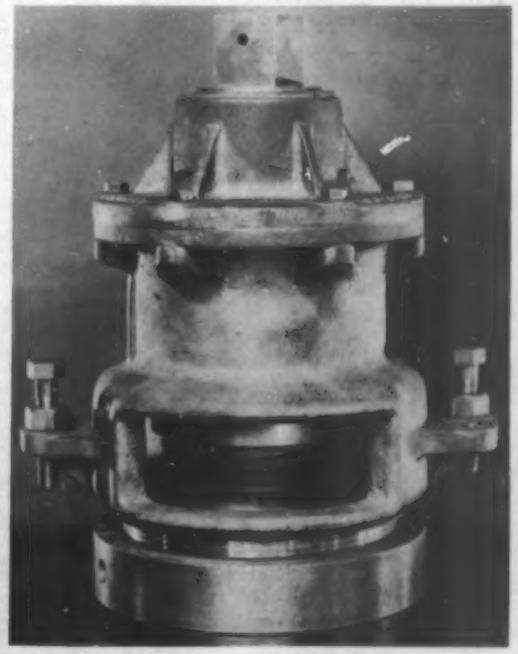
Oil resistance—By oil resistance we mean the degree to which a material retains its useful properties and serviceability in the presence of oils. The most obvious, but seldom the most important, change that occurs when rubber or a rubberlike material is immersed in an oil is the change in volume. Scott[11] showed that the swelling which is characteristic of rubber may be divided into two separate phases, (1) the initial swelling which proceeds rapidly in a few hours or days to such a point that the rubber is incapable of immediately imbibing any more of the particular solvent at the temperature of test and (2) the slower continued increase in volume which represents deterioration of the rubber by the solvent. The initial swelling as measured by a test extended over a period of a month or less has sometimes been taken as a measure of oil resistance. This may be misleading because the change in physical properties that has to do with the serviceability of the product is not necessarily proportional to change in volume.[12] For example, chloroprene rubber can be compounded to undergo no change at all in dimensions in any given oil at any specified temperature, but such a non-swelling compound is frequently not the most serviceable one that could be produced.

The second phase of the swelling is of great importance because it enables one to establish a trend from which the condition of the product after several years' contact with oil can be roughly forecasted. Although important deductions may be drawn from the curve representing change of volume with time, and especially the trend of the curve after a temporary equilibrium has been reached between the rubberlike material and the solvent, it is nevertheless true that the only reliable way to determine the oil resistance of a rubberlike synthetic is to give it a long-time test under conditions comparable to those that may be encountered in service including flexing, compression or other mechanical factors that may be involved and heat, where it is a factor.

Short-time tests are especially unreliable for forecasting the resistance of rubber or rubberlike products to hydrocarbons which contain small amounts of non-hydrocarbon impurities, or materials that are added in small amounts for a specific purpose. Slight modifications of the constitution of the oil or solvent seldom affect the first phase of swelling but may profoundly affect the second phase; that is, they may cause progressive deterioration of the rubber or rubberlike material which would not be forecasted from a brief swelling test.

One is frequently concerned not only with the effect of an oil or solvent on a rubberlike material but with the effect of the rubberlike material on oil. For example, plasticized polyvinyl resins or compositions derived from polymerized chloroprene or butadiene may decrease in volume if they contain an excessive amount of plasticizers due to extraction of the plasticizer or softener by the oil. The decrease in (*Please turn to page 98*)





Left, hose for loading and unloading tankers carrying petroleum products is lined with Neoprene, providing a hose easier to handle and rig, and one which has longer life than types previously used. Above, the seals seen through the opening at the bottom of this tank car outlet, clean scale from the valve seat as it is closed. Neoprene is used for its flexibility and long life even when exposed to the oils and chemicals carried in the car

PLASTICS FEATURE PROGRAMS OF TECHNICAL SOCIETIES

THE PLASTICS GROUP OF THE DIVISION OF PAINT and Varnish Chemistry of the American Chemical Society met in Milwaukee, Wisconsin, on September 7 during the fall convention of the Society. Dr. H. A. Bruson presided during the presentation of two papers which are abstracted as part of this report. Approximately 300 were in attendance and considerable interest was shown in the exhibits which the speakers had assembled to supplement their remarks. Other papers of interest to plastics chemists were given as part of the program of the Coatings Group.

Dr. H. R. Dittmar was elected chairman of the Plastics Group for the year 1939 in recognition of his active part in the organization of the new group and his noteworthy contributions to its programs. Both the spring and fall 1939 meetings of the American Chemical Society are to be held in centers easily accessible to the technical personnel of the plastics industry and it is anticipated that both programs will be unusually full and well attended. Preliminary plans have been made to stress the industrial viewpoint of plastics manufacture and applications at the Baltimore meeting and to develop the theoretical and research aspects at the Boston convention.

A symposium on "Plastics in the Electrochemical Industry" was held at the opening session of the Electrochemical Society in Rochester, N. Y., on October 13. Dr. S. O. Morgan was chairman of the meeting which was attended by about 125 members and guests of the Society. Discussion from the floor followed the presentation of each of the ten papers. The contents of the papers are summarized hereinafter and some will be published in more detail in later issues by permission of the Electrochemical Society.

Symposium on Plastics, Electrochemical Society

THE CLASSIFICATION AND CHEMICAL GENETICS OF ORGANIC PLASTICS, by G. M. Kline. Organic plastics are classified on the basis of chemical source into five principal groups: (1) synthetic resins; (2) synthetic lastics; (3) natural resinous and bituminous plastics; (4) cellulose derivatives; and (5) protein substances. Rubber is not considered in this classification because it is not generally included within the scope of the plastics trade. However, synthetic elastic polymers recently developed and marketed are discussed in the second group and the resinous masses derived from rubber by chemical treatment are described under the third group. The above five groups are further subdivided and the chemical reactions leading to the formation of the members of the various sub-groups are set forth. The outstanding characteristics and principal applications of each type of plastic are summarized and detailed references are given to tabulations of information relating to the properties, methods of fabrication, uses, trade names, and manufacturers and molders of plastics.

ETHYLCELLULOSE FILMS AND PLASTICS, by S. L. Bass and W. C. Goggin. The utility of ethylcellulose films and plastics for electrical insulation depends upon a combination of properties which is unusual among cellulose derivatives. Ethylcellulose films and plastics are mechanically strong and tough, have good dimensional stability, low moisture absorption, and good resistance to heat, light, and the action of water at ordinary temperatures. The dielectric properties of ethylcellulose films vary more with the severity of their exposure to water than to any other condition tested, but are retained to a greater extent than other types of sheeting. Ethylcellulose injection-molded plastics have practically the same dielectric constant as the unplasticized film but have a higher power factor due to the presence of plasticizer. The dielectric properties of ethylcellulose plastics are retained with very little change on exposure to temperatures up to 40° C. and on immersion in water at ordinary temperatures.

POLYMERIZATION OF ACETYLENE BY SLOW ELECTRONS, by G. Glockler and F. W. Martin. The polymerization of acetylene gas was accomplished by low velocity electrons (40–90 e.v.). The reaction was followed by noting the pressure drop in a flow system by means of a hot wire gauge. The difficulty of evaluating the effect of secondary electrons allowed only a rough calculation of the M/N ratio, i.e., the number of molecules reacting per ion pair produced by the electrons. The estimated maximum value was about 8, compared with 20 for alpha rays and 26 for beta rays. A solid reaction product was obtained in a 48-hour run, which had a yellow color and behaved like cuprene.

PREPARATION OF POLYVINYL CHLORIDE PLASTICS FOR ELECTRICAL MEASUREMENTS, by R. M. Fuoss. The experimental precautions necessary in measuring the electrical properties of plastic solids are discussed, with particular reference to edge effects, surface effects, and dimensional changes in the sample. The fundamental criterion of the reliability of the results is the independence of calculated volume properties on the size and shape of the sample and on the details of the mechanical construction of the cell in which the measurements are made. Investigation of the system polyvinyl chloride-tricresyl phosphate indicated that the electrical properties are (*Please turn to page 92*)

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PLASTICS DIGEST

This digest includes each month the more important articles (wherever published) which are of interest to those who make plastic materials or use them

General

DESIGN AND THE PLASTICS INDUSTRY. W. Landauer. Trans. Inst. Plastics Ind. (London) *7*, 19–39, 50 (July 1938). There are three factors which sell plastics other than their physical properties, namely, price, novelty, and design. It cannot be in the interests of the plastics industry to be associated exclusively with the cheap market. Novelty is a temporary, unreliable factor. Good plastics design seems to be the only lastingly reliable sales factor. It is unprecedented and amazing that materials in such wide use should still hardly be known by name to the public. The plastics industry should recognize that by co-operative effort it can profitably and effectively inform the public regarding plastics so that they will know them just as they do metal and wood, will give them credit for their many qualities, and will ask for them by name.

LARGE MOLECULES IN SYNTHETIC CHEMISTRY. G. O. Curme, Jr. J. Franklin Inst. *226*, 187–202 (Aug. 1938). A popular lecture on plastics. In the discussion of prospective developments it is noted that eventual economies in production have not yet been realized and that the full benefits of mass production are yet to come. During recent years the maximum dimension has been increasing constantly due to technical improvements in eliminating stresses due to shrinkage in molding. Should this improvement be carried somewhat further, then it will be possible to produce pieces of the size commonly used in the furniture and home construction fields. When this point is reached there may be expected a very rapid increase in the tonnage of plastic materials consumed.

TRENDS IN THE PLASTICS INDUSTRY. V. E. Yarsley. Chem. and Ind. (London) *57*, 849–51 (Sept. 10, 1938). The industry was founded on thermoplastics, it was vastly enlarged as the "new plastics" industry in the post-war years with the advent of the thermosetting products, and the pendulum is now swinging once again in the direction of the thermoplastic products. This trend is no doubt largely due to the rapid advance made in recent years in injection molding technic. In phenolic plastics, attention appears to be concentrated on the production of shock-resistant products which should ultimately introduce plastics into hitherto closed fields. In the coming years the public will certainly realize that they are no longer limited to wood, metal, or glass, but that they have at their command plastics, the fourth material of construction.

PLASTIC CURIOSITIES. H. C. Bryson. Plastics (London) *2*, 277, 280 (Aug. 1938). An interesting discussion of some odd results obtained with phenolic resins, sulfur moldings, and casein plastic. The use of a low viscosity liquid phenol resin to impregnate plaster of paris articles yields a glossy waterproof product of improved cross-break and tensile strength. The best amount of resin to use appears to be about 33% on the plaster.

MODIFIED PLASTICS 1918–1938. G. J. Esselen and W. M. Scott. Chem. Ind. *43*, 258–67 (Sept. 1938). In 1917 well established industries in the U. S. and Europe were engaged in the manufacture of plastic products from cellulose, casein, rubber, shellac, and bitumen. The progress in the processing of these materials and in the development of new markets during the period 1918 to 1938 is reviewed. Other natural sources of plastics receiving commercial attention are soybean protein, lignin, furfural, and sulfur. This branch of the industry is not static and has the decided economic advantage of cheap raw materials continually being renewed by Nature in great abundance.

Materials and manufacture

WAXES, RESINS, AND ASPHALTS USED IN ELECTRICAL INSULATION. L. McCulloch. Elec. J. *33*, 281–3 (July 1938). The preparation of the many varieties of electrical insulating materials and finishes has called for scores of natural products brought from the four corners of the earth. The types, sources, special properties, and typical uses of the natural waxes, resins, and asphalts are reviewed.

BONDING OF THICK-WALLED NON-DRIED WOOD WITH SYNTHETIC RESINS. J. Dietrich. Kunststoffe *28*, 208–11 (Aug. 1938). A wire screen acts as a carrier for the phenolic resin glue and serves as an electrical heating unit for curing the resin.

SYNTHETIC RUBBER. G. E. Scharff. Trans. Inst. Plastics Ind. (London) *7*, 51–64, 78 (July 1938). This paper is concerned primarily with a comparison of rubber and neoprene with some reference to other butadiene derivatives.

CELLULOSE ACETATE BY HERCULES. J. A. Lee. Chem. and Met. Eng. *45*, 404–8 (Aug. 1938). A description of the new plant and process of the Hercules Powder Co. for manufacturing cellulose acetate. The closed system of processing is said to be unique in this country. In addition to acetic acid, acetic anhydride, and catalyst, methylene chloride is added to the acetylating mixture to ensure a smooth and homogeneous solution during the reaction and a resultant uniform product.

Applications

THE NEW SUNBEAM TALBOT. Plastics (London) *2*, 304–5 (Sept. 1938). The instrument board in this car is molded in one piece, 3 ft., 3 in. in length and weighs 3½ lbs. All the window frames are molded, a multiplicity of colors being obtainable from the same mold. The plastics parts weather better than wood or painted metal and help to deaden noise.

USE OF PLASTICS IN AIRCRAFT CONSTRUCTION. W. Küch. Kunststoffe *28*, 202–7 (Aug. 1938). Experimental results on phenolic, methacrylate, and vinyl chloride resins, particularly as to bending, shear, and impact strengths, are presented. The influence of notches and temperature (−60° to 90° C.) were investigated.

RESIN TO INCREASE DENSITY OF CASTINGS. Automotive Ind. *79*, 85+ (July 16, 1938). Where expensive castings have developed porosity after machining, a phenolic resin is available which can be introduced by pressure or pressure and vacuum to make the casting non-porous.

MOLDED RESINOUS BEARINGS. E. Heidebrook. Kunststoffe 28, 200-2 (Aug. 1938). Experiments with molded bearings are reported.

Testing

PHYSICAL AND CHEMICAL EVALUATION OF PLASTICS. Kunststoffe *28*, 225–44 (Sept. 1938). This is a symposium of ten papers on methods and results of plastics testing. The following topics are discussed: chemical analysis, chemical stability, resistance and permeability to water, hardness and impact strength, electrical properties, thermal testing, and nomenclature.

ALL PLASTIC WINDOW MATERIALS. P. Mabb. Plastics (London) *2*, 279–80 (Aug. 1938). The dimensional changes of cellulose acetate, polystyrene, polymethyl methacrylate, and polyvinyl chloride, when exposed for 3 months (1) at 60° C., (2) immersed in water at 20° C., and (3) to a cycle of 8 hrs. warm humidity and 16 hours cold damp conditions, are reported.

Chemistry

POLYMERIZATION. R. E. Burk. Ind. Eng. Chem. *30*, 1054–63 (Sept. 1938). Polymerization phenomena are summarized in what may be considered to be a supplement to the recent monograph on this subject (see MODERN PLASTICS *15*, 60, Jan. 1938).

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U. S. PLASTICS PATENTS

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PANELS. Harry N. Atwood. U. S. 2,126,711, Aug. 16. Enveloping thin wood strips in cellulose acetate, weaving to form a mat, facing the mat on both sides with cellulose acetate sheeting and compressing in a hot press to form a panel for structural uses.

PLASTICS. B. Andersen and W. D. Paist (to Celluloid Corp.). U. S. 2,126,714, Aug. 16. In forming articles by passing a plastic cellulose derivative through a shaping device, superficial gelatinization is effected by treatment with a solvent, and after expelling the solvent the articles are heated.

STIFFENED FABRIC. C. Dreyfus and G. Schneider (to Celanese Corp. of America). U. S. 2,126,754, Aug. 16. Joining fabric layers under heat and pressure by means of an acetate silk interlayer containing finely powdered titanium dioxide, adhesion being facilitated by adding alcohol.

ALKYD RESIN. W. Heyn (to E. I. du Pont de Nemours and Co.). U. S. 2,126,773, Aug. 16. An oil modified alkyd resin is rendered compatible with urea-formaldehyde resin solutions by heating the alkyd resin in a hydrocarbon solvent.

RESIN. W. R. Marshall (to Bakelite Corp.). U. S. 2,126,794, Aug. 16. An alkali-insoluble resin is made by condensing a halide of phthalic acid or its derivatives with an ester of an aromatic hydroxycarboxylic acid, with or without an added phenol.

BALLOON FABRIC. T. P. Sager and D. F. Houston. U. S. 2,126,818, Aug. 16. Coating a rubberized balloon fabric with an olefin-polysulphide resin to render it more impermeable to gases.

INSULATED WIRE. Wm. Whitehead (to Celanese Corp. of America). U. S. 2,126,850, Aug. 16. Insulating electric wire by winding with filaments of a cellulose derivative plasticized with tricresyl phosphate.

CELLULOSE ACETATE. Wm. Whitehead (to Celanese Corp. of America). U. S. 2,126,851, Aug. 16. Reducing the corrosive properties of cellulose acetate by treatment with dilute (0.3–1%) aqueous solutions of organic bases such as alkanolamines, diamines, alkylamines or cyclic amines.

COUMARONE RESIN. J. M. Weiss (to Calorider Corp.). U. S. 2,126,937, Aug. 16. Making resins by polymerizing the coumarone-indene components of a naphtha which has been thinned with a light hydrocarbon (pentane, butane or propane).

ELECTRIC CABLE. Wm. F. Lamela (to Okonite Co.). U. S. 2,127,122, Aug. 16. Nonflammable rubber-like insulating layers for electric cables are made of polyvinyl chloride and a nonvolatile solvent.

VINYL POLYMERS. H. Plauson (to Röhm and Haas Co.). U. S. 2,127,135, Aug. 16. Emulsion polymerization of vinyl esters in water, with the aid of an emulsifying agent which does not chemically affect the polymer.

LACTIC ACID RESIN. G. L. Dorough (to E. I. du Pont de Nemours and Co.). U. S. 2,127,248, Aug. 16. Polymerizing lactic acid and esterifying the polymer with a monocarboxylic acid or with an alcohol or phenol to form a resin.

SHADE CLOTH. C. A. Alt (to E. I. du Pont de Nemours and Co.). U. S. 2,127,320, Aug. 16. Plasticized nitrocellulose, pigmented with zinc oxide, is applied to a fabric base to make washable shade cloth.

VINYL RESINS. W. O. Herrmann and W. Haehnel (to Chemische Forschungsges. m. b. H.). U. S. 2,127,381, Aug. 16. Hardening polyvinyl ester or polyacrylate or polystyrene resins by effecting the polymerization in solution in presence of a wax.

RESIN PLASTICIZER. C. F. Gibbs (to B. F. Goodrich Co.). U. S. 2,127,400, Aug. 16. Plasticizing a vinyl chloride resin with an organic sulphone.

SURGICAL DRESSING. Walter Dahmen. U. S. 2,127,552, Aug. 23. A surgical dressing which is transparent to X-rays includes a plastic composition in which the filler is transparent to X-rays and the vehicle is a plastic in solution.

AMINE RESINS. T. Sutter (to Ciba Products Corp.). U. S. 2,127,894, Aug. 23. Improving flux and resistance to distortion in amine-aldehyde resins by treating them with a phenolpolyalcohol, added before or during resinification.

ELASTIC PRODUCTS. Herbert Vohrer. U. S. 2,127,896, Aug. 23. Elastic shaped articles are made by kneading polyvinyl alcohol with a plasticizer and a little water, pressing to shape and heating at 135–180° C.

TIRE CORD. Wm. H. Charch and Dorothy B. Maney (to E. I. du Pont de Nemours and Co.). U. S. 2,128,229, Aug. 30. Bonding viscose tire cord to rubber by means of an infusible, insoluble phenol-aldehyde resin.

MOLDING. E. T. Ferngren (to Plax Corp.). U. S. 2,128,239, Aug. 30. Making blown hollow articles from organic plastics by blowing in a mold device and then setting the plastic to a rigid state.

IGNITION COMPOSITION. L. E. Larsson (to Aktiebolaget Siefvert and Fornander). U. S. 2,128,368, Aug. 30. A moistureproof initial igniter for explosives is made by mixing a chlorate with 15–30% of its weight of a phenol-formaldehyde resin in the resol stage, making up to a paste with a filler and a solvent, shaping into an igniter and evaporating the solvent.

MOLDING. A. M. Howald (to Plaskon Co.). U. S. 2,128,533 and 2,128,534, Aug. 30. In making molded shapes, such as buttons, from a granular heat-hardenable plastic a granular blank or preform is first prepared; it may be colored by spraying the surface with a dye solution and hot-pressing to fuse and harden the dyed surface, and can be molded in presence of a mold lubricant.

LAMINATED STRUCTURE. Wm. H. Charch and Dorothy B. Maney (to E. I. du Pont de Nemours and Co.). U. S. 2,128,635, Aug. 30. Bonding rubber to a suitable base by means of a resin derived from an aldehyde and a polyhydric phenol.

WRAPPING FOIL. E. M. Kratz, E. W. Moffett and E. Gebauer-Fuelnegg (to Marbon Corp.). U. S. 2,128,652, Aug. 30. A moistureproof wrapping foil has one layer of regenerated cellulose and one of rubber hydrochloride.

PRINTING INK. A. E. Gessler (to Interchemical Corp.). U. S. 2,128,672, Aug. 30. A printing ink for use on glue-glycerin rolls is nondrying on the press but dries rapidly at 150° C.; it contains a synthetic resin or a cellulose derivative plasticized with the monobutyl ether of diethyleneglycol acetate.

(Please turn to next page)

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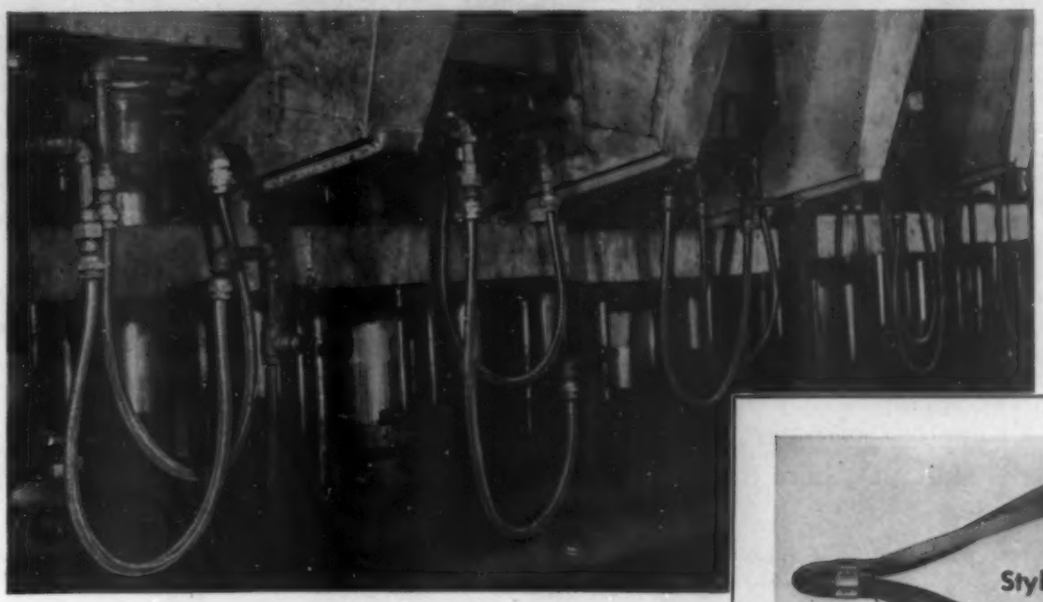

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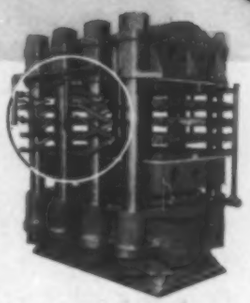

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U. S. PLASTICS PATENTS

(Continued from preceding page)

GREASEPROOF PAPER. C. M. Connor (to Glassine Paper Co.). U. S. 2,128,739, Aug. 30. Greaseproof, moistureproof wrapping paper has two glassine layers and an interlayer of a water-insoluble resin and a wax.

COMPOSITION CORK. K. M. Irey and L. M. Debing (to Resinox Corp.). U. S. 2,128,879 and 2,128,880, Aug. 30. Making a resin by condensing diphenylolpropane first with a ketone and then with an aldehyde; and compounding such a resin with a plasticizer and comminuted cork.

COMPOSITION CORK. S. C. Bond (to Bond Mfg. Corp.). U. S. 2,128,894, Sept. 6. Mixing comminuted cork with a partially reacted heat-hardenable synthetic resin and a cork softener, molding the product and heating to set the resin.

SANDPAPER. R. C. Benner and R. L. Melton (to Carborundum Co.). U. S. 2,128,905, 2,128,906 and 2,128,907; N. P. Robie (to Carborundum Co.). U. S. 2,128,966, Sept. 6. A liquid layer of resinous adhesive is applied to a moving fibrous web, abrasive grains are added and then coated with dry powdered adhesive (with or without the aid of an electrostatic field), and the resinous binder (adhesive) is hardened by heat.

OLEFIN RESIN. L. H. Fitch, Jr. and F. E. Frey (to Phillips Petroleum Co.). U. S. 2,128,932, Sept. 6. Resinification of olefins by reaction with sulphur dioxide is accelerated by silver sulphate, sulphite or nitrate.

INDENE RESINS. Wm. H. Carmody (to Neville Co.). U. S. 2,128,984 and 2,128,985, Sept. 6. Stabilizing indene resins against discoloration reactions by hydrogenating just sufficiently to saturate the terminal cyclopentadiene rings but not the aromatic rings; the treatment may precede or follow distillation of the indene fraction from which the resin is made.

CRESOL RESIN. Erik Schirm. U. S. 2,129,153, Sept. 6. Condensing o-cresol with 2-decalol and hydrogenating the product to form a resin.

IGNITION CABLE. E. W. Trolander and Wm. C. Wilson (to Pyroxylin Products, Inc.). U. S. 2,129,156 and 2,129,157, Sept. 6. A heat-resisting coating for automobile ignition cables is stable at temperatures which would destroy cellulose acetate or nitrocellulose and is made of ethylcellulose and a polyhydric alcohol ester of adipic or higher dicarboxylic acids.

POLYSTYRENE FILMS. W. Harz and W. Schieber (to I. G. Farbenindustrie Aktiengesellschaft). U. S. 2,129,213, Sept. 6. Extruding hot polystyrene through a round or slot orifice and stretching to less than $^1/_{10}$ the diameter of the orifice, to make very fine filaments or tapes.

HEAT SEALING FOIL. E. Gebauer-Fuelnegg and E. W. Moffett (to Marbon Corp.). U. S. 2,129,370, Sept. 6. A transparent moistureproof wrapping foil which is also heat sealing is made of regenerated cellulose coated with rubber hydrochloride and a wax or resin.

RESIN FOR FOILS. R. H. Talbot and B. E. Gramkee; R. H. Talbot (to Eastman Kodak Co.). U. S. 2,129,449 and 2,129,450, Sept. 6. A composition for making transparent films or foils contains ethyl formate and a polyvinyl acetal resin.

ACRYLATE POLYMERS. Otto Röhm (to Röhm and Haas Co.). U. S. 2,129,478, Sept. 6. Effecting polymerization of alkyl acrylate or methacrylate esters in presence of 1% or less of a terpene.

METHACRYLATE POLYMERS. H. J. Barrett and D. E. Strain (to E. I. du Pont de Nemours and Co.). U. S. 2,129,662-3-4-5-6-7-8, Sept. 13. Methacrylates of the primary mixed straight and branched chain alcohols from catalytically reducing carbon oxides; polymerizing secondary or tertiary alkyl methacrylates with the aid of benzoyl peroxide; polymerizing the methacrylates of unsaturated (vinyl, allyl, propargyl, oleyl, etc.) alcohols; polymerizing cyclic esters such as tetrahydrofurfuryl methacrylate; making beta-phenylethyl methacrylate; and polymerizing isobutyl methacrylate in aqueous methanol in presence of benzoyl peroxide.

METHACRYLATE POLYMERS. G. D. Graves (to E. I. du Pont de Nemours and Co.). U. S. 2,129,685, Sept. 13. Polymerizing aryl methacrylates in presence of benzoyl peroxide.

METHACRYLATE POLYMERS. E. F. Izard (to E. I. du Pont de Nemours and Co.). U. S. 2,129,694, Sept. 13. Polymerizing methacrylates of aliphatic polyhydric alcohols.

METHACRYLATE POLYMERS. J. C. Woodhouse (to E. I. du Pont de Nemours and Co.). U. S. 2,129,722, Sept. 13. Polymerized methacrylates of polyhydric alcohols such as glycerol, diethyleneglycol, chlorodihydroxypropane, pentaerythritol, sorbitol and the like.

SOUND RECORD. S. B. Devlin and John Hulsmann. U. S. 2,129,731, Sept. 13. Playing faces for sound records are made of a cellulose ester or ether plasticized with triphenyl phosphate and furfural.

PROTEIN PLASTIC. A. H. G. Sargent (to Reckitt and Sons, Ltd.). U. S. 2,129,749, Sept. 13. Molding compositions made by effecting a cresylic acid-formaldehyde condensation in an aqueous dispersion of a protein.

SANDPAPER. H. C. Martin, F. A. Upper and J. B. Aust (to Carborundum Co.). U. S. 2,129,954, Sept. 13. A cement comprising a solution of a solid phenolic resin in a liquid phenol-aldehyde condensation product is used as binder for abrasive grains on a sheet backing.

DENTIFRICE. Hans Schmidt (to Winthrop Chemical Co.). U. S. 2,130,034, Sept. 13. Use of a solid powdered synthetic resin as a mild abrasive in a dentifrice.

WRAPPING FOILS. K. Nagel and L. Scheffer (to Deutsche Gold- und Silber-Scheideanstalt, vormals Roessler). U. S. 2,130,149, Sept. 13. Casting a film of cellulose ester, treating it in a coagulating bath and coating the resulting foil with a solution of the same cellulose ester.

ABRASIVES. N. P. Robie (to Carborundum Co.). U. S. 2,130,194, Sept. 13. A binder for abrasive grains on paper or cloth comprises a heat-hardenable alkyd and a water-soluble borate resin.

LACQUER. C. H. Humphries (to Sealkote Corp.). U. S. 2,130,238, Sept. 13. A blended cellulose acetate lacquer containing also an alkyd resin with softening point between 60 and 95°C.

NACREOUS EFFECTS. B. E. M. Miller (to Celanese Corp. of America). U. S. 2,130,359 and 2,130,360, Sept. 20. Imparting decorative effects, e.g., resembling mother-of-pearl, to rayon crushed velvets by cementing a transparent cellulose acetate foil to the pile of face the velvet, then stripping off the foil.

TOY. Frank M. Hoover. U. S. 2,130,427, Sept. 20. A rattle made by stringing perforated urea resin disks on a string or chain.

COATED WALL BOARD. John Fletcher (to Plastergon Wall Board Co.). U. S. 2,130,530, Sept. 20. Coating a wet pulp board with a nitrocellulose emulsion lacquer, evaporating the organic solvent in a humid atmosphere, then drying to evaporate the water.

LIGNIN PLASTIC. E. C. Sherrard, E. Beglinger, J. P. Hohf and E. Bateman (to Henry A. Wallace, Secretary of Agriculture of the U. S.). U. S. 2,130,783, Sept. 20. Making a lignocellulose-aniline thermoplastic by condensing aniline with fibrous materials in presence of water.

(Please turn to page 96)

Thanks to this INSULATION MFG. CO. FIRST AWARD WINNER!

Sleet... high air velocity... below-zero temperatures... would like to shatter this Learadio Loop Housing, used to protect the wireless loop on commercial aircraft!

They would like to—**BUT THEY CAN'T!** Because Insulation Mfg. Co. engineers, having selected a material that *can't* interfere with transmission and reception... have provided a *construction so durable that neither landing impact, sleet, nor terrific air pressures can distort or crack it!*

No wonder the judges chose it, over all others, as **FIRST AWARD WINNER IN THE TRANSPORT GROUP!**

Picture the 300 ton press necessary to mold this great housing.

Realize that the problems of molding and planning production embraced the intricacies of aerodynamics as well as radio.

Total these—with the knowledge that this is but one of scores of outstanding Insulation Mfg. Co. moldings for the industrial field—and you have a conception of the size and modernity of our equipment... and the ability and versatility of our engineers (gained thru nearly 50 years of experience in the plastic field!)

Consult us *first* on your molding jobs—whatever material, whatever size... You'll find us ready to work *with* you!

INSULATION MANUFACTURING CO.

11 NEW YORK AVENUE BROOKLYN, N. Y.

FOREIGN PLASTICS PATENTS

Application dates are given for patents of European countries, but for Canada the issue date is given

DENTURES. Röhm und Haas Aktiengesellschaft. British P. 482,194, Sept. 19, 1936. Dentures made of polymer resins are cast in the monomeric or partially polymerized form, and polymerization is completed in the mold, which may be lined with polyvinyl alcohol or sodium polyacrylate to facilitate removal.

UREA RESIN. H. L. Bender and H. A. Hoffman (to Bakelite Corp.). Can. P. 375,452, Aug. 2, 1938. Effecting urea-aldehyde resin condensations in presence of ethylenediamine, neutralizing the slight basicity with ethylene chlorohydrin, adding a filler and masticating on hot rolls to form a molding composition.

HYDROGENATED RESIN. R. T. Ubben (to Canadian Industries, Ltd.). Can. P. 375,457, Aug. 2, 1938. Catalytic hydrogenation of a phenol-formaldehyde resin over a nickel catalyst, and use of the product in a drying oil paint.

ALKYD RESIN. C. Sly (to Canadian Industries, Ltd.). Can. P. 375,478, Aug. 2, 1938. An alkyd resin, modified with a cellulose derivative, for use in coating compositions.

EXTRUSION MOLD. J. W. Macklin (to Thermo-Plastics, Inc.). Can. P. 375,533, Aug. 2, 1938. Making shaped articles from thermoplastics by heating to a plasticizing temperature in one chamber, extruding into another chamber where additional heat is applied, and ejecting the material into the mold.

INSULATED WIRE. Rockbestos Products Corp. French P. 825,851, Aug. 23, 1937. Winding wire spirally with several layers of thin rubber hydrochloride tape (which is oilproof, flexible, relatively nonflammable and resistant to chemicals and solvents), and coating with asbestos felt impregnated with a flameproof composition.

PHENOL-KETONE RESIN. British Celanese, Ltd. British P. 483,066, July 3, 1936. Condensing resorcinol with methyl ethyl ketone in presence of hydrochloric acid to form a yellow resin.

NACREOUS FINISH. Kurt Albert G. m. b. H. Chemische Fabriken. Austrian P. 152,571, Jan. 24, 1936. Imparting nacreous iridescence or other luster effects to phenol-aldehyde resin products by grinding lead phosphate in glycerin and incorporating the mixture in the resin before final hardening of the resin.

ACETAL RESIN. Carbide and Carbon Chemicals Corp. French P. 825,423, Aug. 9, 1937. Plasticized polyvinyl acetal resins are shaped with the aid of a little water, e.g., by sheeting on a roll mill to form interlayers for safety glass, or by extrusion from a tubing machine.

UREA RESINS. D. E. Edgar and P. Robinson (to E. I. du Pont de Nemours and Co.). Australian P. 103,293, Feb. 17, 1937. Condensing urea with formaldehyde in presence of butanol, with or without toluene and a small proportion of phthalic anhydride, while distilling off the water liberated in the reaction.

MOLDING POLYMER RESINS. Röhm und Haas Aktiengesellschaft. British P. 482,836, Oct. 5, 1936. Molded articles are made of vinyl polymers or interpolymers by forming first a raw shaped blank, coating it with a film of monomeric or partially polymerized vinyl compounds, and polymerizing the film in contact with a mold or plate. Dentures, glass substitutes, lenticular photographic screens, and other articles may be made in this way.

BUTTONS. W. Grabner, H. Hinkelmann, O. Seifert, and P. Reussner (trading as Grabner and Co.). British P. 482,851, May 31, 1937. Synthetic resin buttons are molded in a row, as a plate in which weakening grooves are formed to outline each button, and projections in the die form holes in each button.

CELLULOSE PHTHALATE. L. B. Genung (to Eastman Kodak Co.). Can. P. 375,626, Aug. 9. 1938. Making cellulose phthalate or acetatephthalate by esterifying cellulose or partially acetylated cellulose with phthalic anhydride.

ELASTIC RESINS. W. Starck and W. Heuer (to I. G. Farbenindustrie Aktiengesellschaft). Can. P. 375,628, Aug. 9, 1938. A rubber-like vinyl resin product having exceptional elasticity contains as plasticizen tricresyl phosphate or dibutyl phthalate, and as catalyst stearyl or oleyl peroxide.

INJECTION MOLDING. Röhm und Haas Aktiengesellschaft. French P. 822,822, Aug. 5, 1937. Methacrylate polymers, and their interpolymers with acrylate esters, polystyrene or the like, are suitably compounded with fillers, plasticizers, cellulose esters or the like and shaped by injection molding at 225–275° C.

MOLDS AND CORES. R. F. J. Ricard. French P. 826,276, Dec. 8, 1936. Hardenable phenolic resins are compounded with graphite and used in making molds or cores for metal casting, e.g. by lining the inside of a sand mold with the resin composition.

WRAPPING FOILS. I. G. Farbenindustrie Aktiengesellschaft. French P. 823,499, June 23, 1937. Foils or ribbons of solvent-free thermoplastics (chlorinated rubber, benzylcellulose, polystyrene or polyvinyl chloride) are improved by being heated to the plastic state and stretched.

ABRASIVES. Otto Schneider. German P. 660,633, April 17, 1935. Abrasive shapes in which the binder is a polyacrylate or polystyrene resin in admixture with a high-boiling aldehyde and a phenol, e.g. furfural and cresol, or benzaldehyde and phenol.

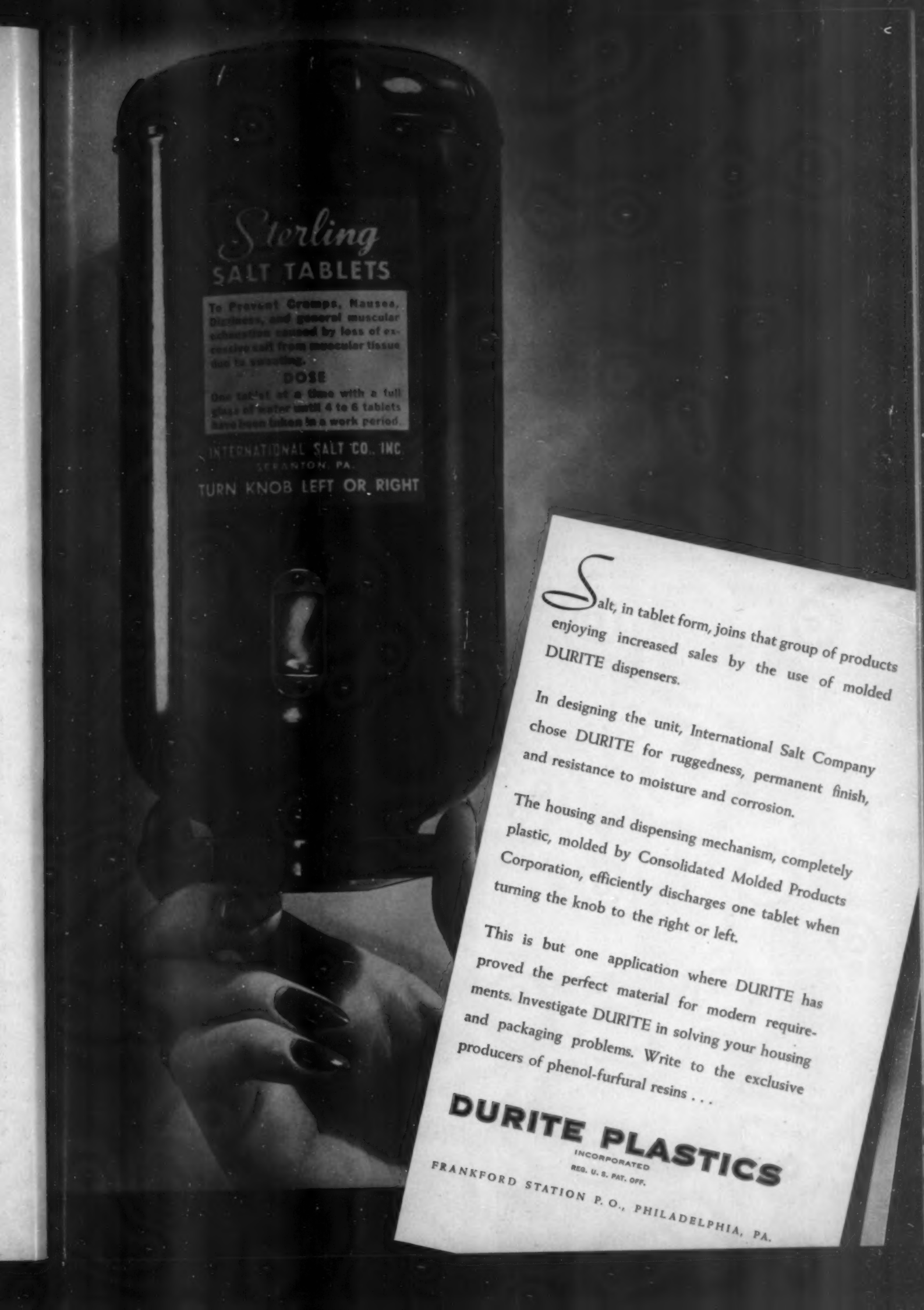
SAFETY GLASS. Röhm und Haas Aktiengesellschaft. German P. 660,634, March 14, 1928. As interlayer in safety glass, a rubber-like elastic film of ethyl (or methyl) polyacrylate without the aid of any cellulose ester.

FOILS. Deutsche Celluloid-Fabrik. German P. 660,456, Nov. 1, 1934. Sheeting polymers of vinyl alcohol or chloride, or of acrylic acid derivatives or interpolymers of these compounds, by passage through a roll mill in presence of a small proportion of a volatile solvent.

BLENDED RESINS. J. Lichtenberger (to Societe Etablissements Lambiotte Freres). German P. 661,600, Feb. 21, 1934. Forming phenol-formaldehyde resins in presence of hydrogen sulphide and a nitrogen compound which itself can form resins with formaldehyde, e.g. urea, thiourea, cyanamide, arylamines, amides, and sulphonamides.

SAFETY GLASS. I. G. Farbenindustrie Aktiengesellschaft. German P. 660, 904, April 28, 1930. Safety glass having an interlayer of polyvinyl alcohol or a derivative thereof which dissolves or swells in water.

RUBBER DERIVATIVE. H. A. Winkelmann (to Marbon Corp.). Can. P. 375,806, Aug. 16, 1938. A molding composition comprising rubber hydrochloride, litharge and magnesium oxide, for use where high heat stability and freedom from brittleness are essential.


Sterling
SALT TABLETS
To Prevent Cramps, Nausea, Dizziness, and general muscular exhaustion caused by loss of excessive salt from muscular tissue due to sweating.
DOSE
One tablet at a time with a full glass of water until 4 to 6 tablets have been taken in a work period.
INTERNATIONAL SALT CO., INC.
SCRANTON, PA.
TURN KNOB LEFT OR RIGHT

Salt, in tablet form, joins that group of products enjoying increased sales by the use of molded DURITE dispensers.

In designing the unit, International Salt Company chose DURITE for ruggedness, permanent finish, and resistance to moisture and corrosion.

The housing and dispensing mechanism, completely plastic, molded by Consolidated Molded Products Corporation, efficiently discharges one tablet when turning the knob to the right or left.

This is but one application where DURITE has proved the perfect material for modern requirements. Investigate DURITE in solving your housing and packaging problems. Write to the exclusive producers of phenol-furfural resins . . .

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NEWS

IN THE ROCK RIBBED REPUBLICAN HILLS OF VERMONT, on the tenth and eleventh of last month, the members of the Society of the Plastics Industry (including one lone new-dealer) met at their annual Fall meeting. Over ninety members attended the gathering held at the Equinox House, Manchester, with representatives present from all branches of the industry.

A note of serious discussion and planning, almost new to meetings of the group, was evident. The Board of Directors met on Sunday evening to hear the report of the program committee, appointed at the Spring meeting. After this report and discussion on other matters of common interest, the board formulated a program of action for submission to the main body. Among the proposals were an appropriation to care for the collecting and compilation of industry statistics; the appointment of an entertainment committee for future get-togethers; the establishment of regular annual dues and registration of members' trademarks with the secretary.

At the banquet the following evening, with President Allan W. Fritzsche of General Industries Inc. in the chair, these proposals were put before the membership and accepted unanimously. The idea of collecting monthly figures on plastics production was particularly well received. Most of those present felt that this is the most constructive step yet taken by the organization.

After briefly discussing possible sites for the next Spring meeting, the choice was left to the discretion of the officers. They were instructed to investigate the various suggestions and to announce their decision in adequate time for members to make necessary plans.

The social side of the convention, however, was far from neglected. Following the precedent of past years, a golf tournament featured the entertainment program. The awards, which ranged from a camera to a bottle of scotch, were made at the banquet.

Harry W. Hahn came 3000 miles from Los Angeles to attend the meeting. Mr. Hahn became so enthusiastic with the plans made at the meeting, that he returned to the Coast with an authorization from the Society to organize a Pacific group.

Among those there were: R. H. Allen, Consolidated Molded Products Corp.; G. P. Anderson, Auburn Button Works; James Bailey, Hartford Empire Co.; E. W. Birney, Consolidated Molded Products Corp.; A. S. Blackinton, Associated Attleboro Mfgrs.; C. W. Blount, Bakelite Corp.; G. H. Boehmer, Celluloid Corp.; Edward Borro; Allan Brown, Bakelite Corp.; Gordon Brown, Bakelite Corp.; Michael A. Brown, Modern Plastics; Sandford Brown, Bakelite Corp.; D. M. Buchanan, Bakelite Corp.; George Carlson, Bakelite Corp.; J. H. Clark, Monsanto Chemical Co.; B. F. Connor, Colt's Patent Fire Arms; W. J. A. Connor, Celluloid Corp.; W. T. Cooper, Bakelite Corp.; W. T. Cruse, Celluloid Corp.; Donald Dew, Diemolding Company; C. W. Douglas, Associated Attleboro Mfgrs.; Howard G. Fairfax, Firestone Rubber & Lastex Prod. Co.; Arthur Freeman, New York World's Fair 1939; W. A. Freyer, Auburn Button Works; Allan W. Fritzsche, General Industries, Inc.; T. E. Giblin, General Electric Co.; Robert Y. Grant, Jr., Tennessee Eastman Corp.; George C. Gress, Monsanto Chemical Co.; V. A. Gwyer, Hartford-Empire Co.; Harry W. Hahn, Hahn Plastic & Die Cast Corp.; A. W. Hanmer, General Plastics, Inc.; W. E. High, Auburn Button Works; W. G. Hirschfeld, Reilly Tar & Chemical Co.; W. B. Hoey, Bakelite Corp.; J. E. Horn, Bakelite Corp.; Prescott G. Huidekoper, American Insulator Corp.; Charles H. Hunton, E. I. DuPont DeNemours & Co.; George A. Johns, American Insulator Corp.; C. L. Jones; Sam W. Jones, Plaskon Company; W. E. Kasel, General Electric Co.; W. L. Kelly, Chicago Molded Products Corp.; Donald S. Kendall, Mack Molding Co.; Ronald Kinnear, Albany Ball and Billard Co.; Gordon Kline, U. S. Bureau of Standards; William Lester; Louis Levine; Charles Lichtenberg, Resinox Corp.; E. F. Lougee, Modern Plastics; Kenneth W. Macksey, Mack Molding Co.; M. M. Makeever, Makalot Corp.; Theodore Marvin, Hercules Powder Co.; James McIntosh, Mack Molding Co.; M. G. Milliken, Hercules Powder Co.; Fred Morlock, Durite Plastics; D. A. Munns, Bakelite Corp.; J. B. Neal, Norton Laboratories; C. A. Norris, Bakelite Corp.; Robert O'Kane, Monsanto Chemical Co.; Spencer E. Palmer, Tennessee Eastman Corp.; Lewis J. Pentland, General Plastics; E. R. Perry, Westinghouse Electric & Mfg. Co.; Henry A. Persyn; David S. Plume, Rohm & Haas Co.; C. F. Reeves, Monsanto Chemical Co.; Walter Reibold, Waterbury Button Co.; E. F. Riesing, Firestone Tire & Rubber Co.; C. F. Romieux, American Cyanamid Co.; George K. Scribner, Boonton Molding Co.; George H. Sicard; C. E. Slaughter, Plaskon Co.; F. H. Sorensen, American Cyanamid Co.; H. S.; Spencer, General Plastics Co.; Horton Spitzer, Plaskon Co.; Norman L. Stafford, Diemolding Corp.; Thomas R. Sterck, Plastic Inlays; G. M. Stone, General Electric Co.; S. W. Stone, Colt's Patent Fire Arms; J. G. Swanson, Levitan Co.; M. Guy Sypher, Plastic Inlays; Paul C. Tietz, The Richardson Company; Edward W. Vail, Jr.; Bakelite Corp.; A. R. Van Horne, Albany Billiard Ball Co.; H. H. Wanders, Northern Industrial Chemical Co.; C. H. Whitlock, Firestone Tire & Rubber Co.; William K. Woodruff, Celluloid Corp.

PRECISION TO THOUSANDTHS

Waterbury precision methods in mold-making and plastic molding produced this housing for the Gem-lectric Shaver. Depth dimensions on the dies required tool making accuracy to one tenth of a thousandth in order to create plastic housings with dimensions being held to plus or minus .001 at some points.

As in scores of other instances, Waterbury designers, engineers and mold makers have met difficult problems successfully. Skilled craftsmen and a completely equipped plastics plant, backed with a full twenty-four hour working schedule, have geared Waterbury to handle any plastic molding job. May we help you with yours?

PLASTICS DIVISION

THE WATERBURY BUTTON COMPANY

MAIN STREET WATERBURY, CONN.

NEW YORK CITY • BOSTON • PHILADELPHIA • ROCHESTER • DETROIT • CHICAGO • TORONTO • CLEVELAND

NEWS

THE BIG BLOW WHICH SWEPT NEW ENGLAND ON SEPTEMBER 21 did considerable damage to the Reed-Prentice Corporation plant at Worcester, Mass. The accompanying photograph shows the result of the falling of their smoke stack on the boiler room. Besides this damage, the second and third floor end wall of the office building was blown out into the driveway. Operations were resumed, however, on the following day and rebuilding is under way. Reed-Prentice Corporation are manufacturers of injection molding presses and other equipment used in plastics and metal fabrication.

THE AUTOMOBILE SHOW NUMBER OF COLLIER'S, WHICH will appear on newsstands November 11th, has an interesting cover design worked out by C. C. Beall through color photography of plastic parts.

KARL W. NELSON, SALESMANAGER OF THE PLASTICS DEpartment, General Electric Company, passed away at his home in Pittsfield, Mass., on October 16th. Mr. Nelson has been ill for some months but recently had been spending a few hours each day at his office and was thought to be well on the road to recovery. His untimely death came as a distinct shock.

THE NEW YORK OFFICE OF THE UNIVERSAL PLASTICS CORporation has been moved to 12 East 41st Street.

A NEW PAINT, THE FIRST SUCCESSFUL COATING FOR CREOsoted wood block flooring is announced by the Reilly Tar and Chemical Corporation. This product, known as Crecote, has been in the process of development and testing over a period of years.

THE FIBERLOID DIVISION OF MONSANTO CHEMICAL COMpany, Indian Orchard, Mass., acquired last April, henceforth will be known as Plastics Division, the company announced recently. The expansion of the scope of activity of this division warrants the change in name, according to the report. District offices are maintained at New York, Chicago, St. Louis and Los Angeles.

TRACE AND WARNER, INDUSTRIAL DESIGNERS, HAVE occupied their new office at room 1210, 155 No. Clark Street, Chicago, Illinois, where they will serve their clients in larger quarters.

THE PLASTICS DIVISION OF THE GORHAM COMPANY announces the appointment of Jerry F. Howard as its representative in New York. Mr. Howard will maintain offices at 6 West 48th Street, telephone Bryant 9-4657.

DEAN E. BASKERVILLE, RECENTLY SALES ENGINEER IN THE Detroit area of the Norton Laboratories, Inc., and formerly automotive body engineer of Dodge Brothers and Chrysler, has recently become associated as sales engineer of Thermo-Plastics, Inc., a division of the Standard Products Company. He is located at 522 New Center Building, Detroit.

THE CHEMICAL MANUFACTURING FIRM OF E. I. DU PONT de Nemours & Company today announced plans for an extensive exhibit at the San Francisco Golden Gate Exposition. The Company has leased approximately 6,500 square feet in the Homes and Gardens Building, and will erect a completely self-contained structure of its own within the walls of the Building. It will house a series of dramatized presentations showing the social contributions of chemistry. Purpose of the display, officials indicated, is an interpretation of the achievements of America's diversified chemical industry to the West Coast area.

THE RESISTOFLEX CORPORATION HAS RECENTLY ANnounced a new synthetic resin tubing, basically polyvinyl alcohol, which, because of its inertness to many chemicals, its resiliency and light weight, is adaptable for use with a wide range of solvents and reagents. Known as Resistoflex PVA, the product is available in a number of different sizes up to one-half inch inside diameter, and is made with various outside sheathings for specialized applications. It is impervious to many oils and hydrocarbons, according to reports, and will withstand the effects of many corrosive agents.

KAY-FRIES CHEMICALS, INC., HAS STARTED PRODUCTION OF formaldehyde at its West Haverstraw, N. Y., plant, according to J. T. Ames, vice-president. Mr. Ames stated that the annual production capacity of the new formaldehyde unit is between 12,000,000 and 20,000,000 pounds. A synthetic methanol process will be utilized for production of the material, basic in many plastics.

DESPATCH OVEN COMPANY ANNOUNCES THE APPOINTMENT of the Scientific Supplies Company, 123-125 Jackson Street, Seattle, Washington, as exclusive Despatch Industrial Oven and Furnace Representatives in the states of Washington, Oregon, Idaho and Montana.

AT A MEETING OF THE BOARD OF DIRECTORS OF THE HYdraulic Press Manufacturing Company held on October 10, 1938, at the office of the company in Mount Gilead, Ohio, Howard F. MacMillin was elected as president of the Company. He succeeds his father, F. B. MacMillin, whose long and faithful service to the company was terminated by his death on September 8, 1938.

Mr. MacMillin has been general manager of the company for the past two years and continues in that capacity. He has been associated with the company continuously since his graduation from Massachusetts Institute of Technology in 1921, at which time he entered into work as sales engineer, then as salesmanager, director, vice-president and general manager. At the same meeting H. A. Toulmin, Jr., of Dayton, Ohio, was elected as director to fill the unexpired term of F. B. MacMillin who was also a member of the board.

AN INTENSIVE DEMAND ON THE PART OF AIR-LINES, RAILroads, steamships, hotels, etc. in "fire-proofing" upholstered furniture, and drapes has resulted in the production of a practical flame-proofing, called Ignex. This is a watery liquid that is odorless and harmless to humans and fabrics. It is being successfully used on stuffings of paper leather, wool, cotton, kapok and wood shavings as well as on all commercial textile fabrics, feathers, Christmas-trees and display materials, according to Glyco Products Co., Inc., its manufacturer.

FRANK B. WILLIAMS HAS BEEN ELECTED VICE-PRESIDENT in charge of the merchandising division of the Westinghouse Electric and Manufacturing Company.

"DELTAGLASS" DESIGNATES THE NEW GLASS FIBER INSUlation used for a new line of glass-insulated magnet wire recently announced by the General Electric construction materials division, Bridgeport, Conn. Like the G-E Deltabeston asbestos-insulated magnet wire, the new product is available in round, square, and rectangular shapes. G-E Deltaglass magnet wire, recommended for apparatus windings where the temperature does not exceed 125 degrees Centigrade, is wound with a glass yarn to which Glyptal varnish, made especially for this purpose, is applied. Following this another layer of glass yarn is wound on. The Glyptal varnish permeates both layers, binding them together and to the copper conductor. The varnish also seals the glass and furnishes a smooth, uniform, moisture-resistant surface.

8 TIMES HONORED in 3 SUCCESSIVE COMPETITIONS!

Two years ago, in the first Modern Plastics Competition, Chicago Molded Products Corp. won two awards.

Last year, we were a three-times winner.

And to top off this phenomenal record, this year again, we receive triple honors!

There is no parallel to this record, among firms who process plastics. No finer testimonial to the way Chicago Molded Products turns out each and every job could be found than in this eloquent list of prize-winning . . . and sales-winning . . . plastic products!

CHICAGO WINS FIRST AWARD IN THE HOUSEHOLD GROUP, molding the Radio Nurse Receiver for Zenith Radio . . . considered one of the outstanding plastic jobs among hundreds of entries in this class.

FROM ONE MOLD comes eight attractive variations of the handsome Detrola Super Pee-Wee radio cabinet . . . And thus appealing to all tastes, Detrola marks up many sales where but one resulted before. SECOND AWARD in the DECORATIVE GROUP!

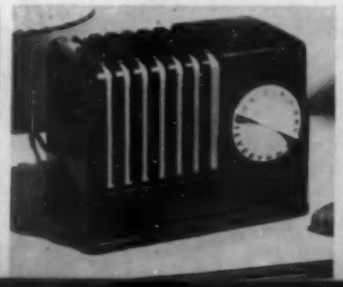
DOWN TUMBLED COSTS when plastics were adopted for the "Stop-Watch-Man" of Precision Scientific Co. Here again, Chicago Molded Products was chosen as the logical molder to produce a better looking, better functioning article. The new holder won't tip over. Can't stain. And its selling price is now $2.95 whereas previously made of metal, it was $4.75!

(1937 Winners) Zephyr Crystal Record Reproducer
White Technotrol Thermostat
Oculite Dental Operating Light

(1936 Winners) Burton X-Ray Projector
Sears Roebuck Radio Cabinet

CHICAGO MOLDED PRODUCTS CORP.

2146 WALNUT STREET — CHICAGO, U. S. A.



PUBLICATIONS

Write for these booklets. Unless otherwise specified, they will be mailed without charge to executives who request them on business stationery. Other books will be sent postpaid at the publisher's advertised prices.

Second Report on Viscosity and Plasticity

Prepared by the Committee for the Study of Viscosity of the Academy of Sciences at Amsterdam

Nordemann Publishing Co., Inc., New York, 1938
Price $7.50 **287 pages, 80 figures**

These six surveys relate to various phenomena of viscosity and plasticity, particularly to problems concerning the internal structure of liquids. In chapters I and II the several theories proposed for the explanation of the viscosity of pure liquids and of its dependence upon temperature are reviewed by J. M. Burgers and F. M. Jaeger, respectively. The orientation of small particles of elongated form suspended in a liquid in laminar flow and the influence of such particles upon the effective viscosity of the liquid are considered by J. M. Burgers in chapter III. In chapter IV an account is given by R. Houwink of the phenomena of flow for certain substances associated with the presence of a yield value. Recently developed apparatus for the measurement of flow properties are discussed in chapter V by C. J. van Nieuwenburg for substances with high values of the coefficient of internal friction and in chapter VI by R. N. J. Saal for mineral oils.

The high quality of the typography and physical make-up of the book are also noteworthy and it is little wonder that the demand for the First Report has necessitated its reprinting. We are greatly indebted to the Royal Netherlands Academy of Sciences for these excellent contributions to the fundamentals of the flow properties of plastic materials. G. M. K.

Herstellung und Verarbeitung von Kunstharzpressmassen

by Kurt Brandenburger

Published by J. F. Lehmanns Verlag, Munchen, 2nd Edition, 1938
Price (foreign) 15 RM or 16.50 RM bound. 355 pages, 362 figures

This book on the manufacture and molding of synthetic resin products is a second edition of a treatise on this same subject originally issued in 4 volumes during 1935, 1936 and 1937, but now condensed to a single handy volume. It is primarily concerned with the heat hardenable resins of the phenol-formaldehyde and urea-formaldehyde types. The 17 chapters discuss the manufacture of the resins and laminated products, the presses and molding processes, the molds and design of parts, the finishing of molded parts, the testing of molding materials and products (briefly), and the uses of plastics in various industries. The omission of the thermoplastic materials, particularly the resins derived from acetylene (vinyl type), from consideration is attributed in the author's preface to the impossibility of reducing this rapidly developing phase of the industry to book form. G. M. K.

Handbook of Chemistry and Physics—22nd Edition

Charles D. Hodgman, Editor in Chief

Chemical Rubber Publishing Co., Cleveland, 1937–38
Price: $6 in U.S. and Canada, $6.50 elsewhere. **2069 pages**

This revision of the Handbook, of which the 21st edition was reviewed in MODERN PLASTICS 14, 55 (Dec. 1936) includes among other changes new data in the following tables: Special Solutions and Reagents, Composition and Value of Foods, Viscosity Section, Transmission of Gelatin Filters, Characteristics of Thermionic Vacuum Tubes and Atmospheric and Meteorological Data. The 17-page table devoted to the properties of commercial plastics is again a feature of this ready-reference book of chemical and physical information. By way of emphasizing the value of the constant revision of this Handbook, it may be of interest to note that the day this is written this reviewer looked in vain in the 21st edition for certain values, but found them recorded in this new edition.

An Introduction to Microchemical Methods

by Cecil L. Wilson

Chemical Publishing Co. of N. Y., Inc., Agents in N. and S. America
Price $3.00 **196 pages**

The elements of chemical microscopy, microchemical investigation and analysis of inorganic and organic compounds, colorimetry and spectrography are covered in this textbook prepared especially for senior students in college chemistry. It will also serve as a source of general information on microchemical technique for chemists unacquainted with this field. G. M. K.

THE AMERCOAT SALES AGENCY, 5905 PACIFIC BOULEVARD, Huntington Park, California, has issued two bulletins describing the Amercoat line of surface coatings. These materials, which have been developed for use in lining concrete, metal surfaces, marine surfaces and a number of other places where corrosion and abrasion are met, may be sprayed, brushed or troweled on as conditions demand. The details regarding the specifications and applications of the various types are given, and the methods of use described.

A BOOKLET EXPLAINING THE METHOD OF APPLYING THE Posmoulage process to the making of casts from living subjects, biological specimens, footprints and a number of other subjects, has been issued by the Warren-Knight Company, 136 North 12th Street, Philadelphia, Pa. The process resembles the older plaster cast method, but the materials used represent a distinct departure, having advantages that older methods cannot present.

CARBIDE AND CARBON CHEMICALS CORPORATION, 30 E. 42nd St., New York City, announces the publication of a new folder entitled, "Synthetic Ketones." Known as "Chemical Group Folder No. 6," this publication is the first of a series of new folders which are designed to present, briefly and concisely, information on various organic chemical families. The present folder covers the applications and properties of fourteen synthetic ketones which are used as industrial solvents and intermediates. A table shows boiling points, vapor pressures, solubilities, and other properties in a form in which they can be easily compared. Other folders of the series, soon to be published, will give similar data on alcohols, glycols, amines, acids and other organic families.

"LUMARITH FOR MOLDING," A NEW BOOKLET ISSUED BY the Celluloid Corporation, 10 East 40th Street, New York City, clearly explains for the layman the uses and characteristics of this cellulose acetate molding material. The general process of injection and compression molding, and the various types of molds are also described. Attractive illustrations serve to give an excellent idea of the versatility of the material.

THE TENNESSEE EASTMAN CORPORATION HAS ISSUED A booklet titled "Tenite Specifications" describing the various types of the material, their physical characteristics and the system by which they are designated. A series of graphs show the variations in properties from type to type and serve as a reliable guide in the specifying of molding materials. Each grade is dealt with specifically thus enabling the user to obtain an accurate picture of the technical qualifications.

THE APPLICATIONS AND METHODS OF USING LAMICOID laminated material in architecture are described in a new 20-page booklet published by the Mica Insulator Company, 200 Varick Street, New York City. The specifications of the various grades of the material and their particular properties are given permitting a choice of the proper type by the designer or architect. Construction details are shown in a large number of drawings, as well as the methods of fabricating and assembling. Illustrations showing typical applications in various types of buildings are given.

"STOKES should get our molding business!"

More than one of our customers' production managers has been a star salesman for us—and here are a few reasons why.

In the first place, 41 years of unhurried yet healthful growth has given us the experience to merit your thoughtful consideration. . . . . We're close to sources of supply, making material costs the lowest obtainable. Naturally you share this economy. . . . . We've constantly added to our facilities, assuring uninterrupted operation through ample reserve equipment held ready for any emergency. . . . . Our engineering and designing staffs co-operate to produce smart, modern yet practical moldings that sell . . . . If there are any questions we haven't anticipated, fire away. We'll give you the answers.

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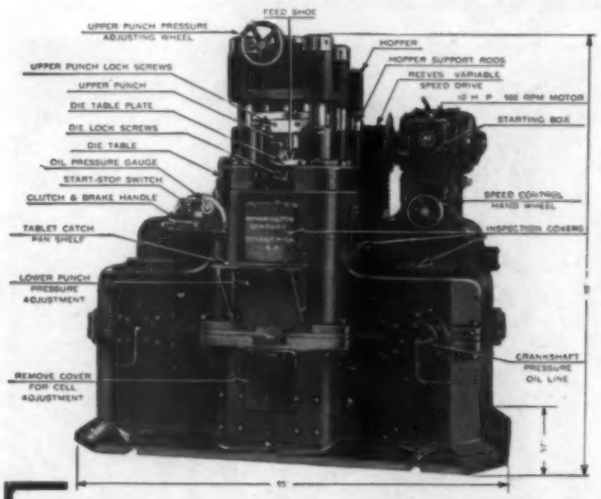

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The finest machine of its kind . . . specially designed to meet the new standards of large unit molding. All working parts sealed against dust. Pressure feed oiling to all bearings. Maximum cell depth . . . $3\frac{3}{4}$", maximum dia. round tablet . . . $4\frac{1}{2}$". Speed 25 to 30 tablets per minute. Double toggle, twin crankshafts . . . hence compression from *both* sides of tablet insuring uniform density throughout.

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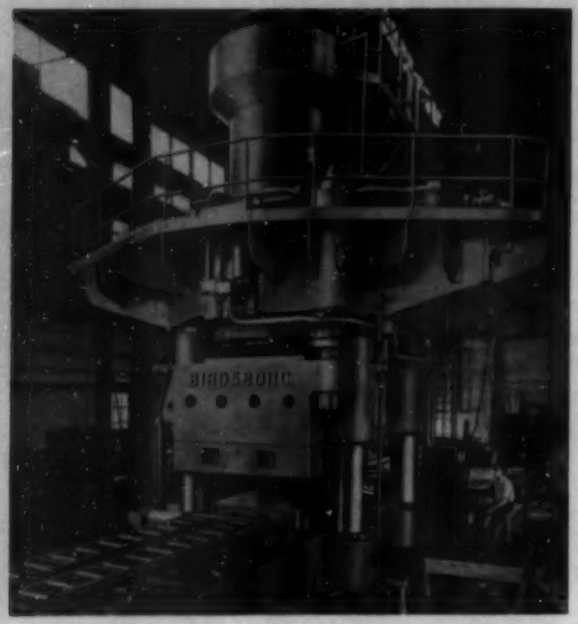
EQUIPMENT



WHAT IS REPORTED TO BE THE WORLD'S LARGEST HYdraulic press, designed for shearing and forming airplane parts has recently been built by the Birdsboro Steel Foundry and Machine Company for foreign delivery. Having a platen area 200 by 900 in., the press is capable of exerting a pressure of 5500 tons. Operation is by a simple system of finger-tip controls.

A TIME CYCLE CONTROLLER FOR USE IN THE AUTOMATIC timing and control of repeated operations of various machinery has been announced by the Industrial Instrument Company.

FOR GENERAL SANDING OPERATIONS, THE VAN DORN Electric Tool Company has announced a two speed sanding unit adaptable to both seven and nine inch abrasive discs. A simple gear shift in the gear housing controls two sets of double gears. Because of this alternate arrangement, nine inch discs, when worn, may be trimmed to seven inches and reused on the same machine. A universal AC-DC motor is standard equipment.

A NEW AIR DUSTING GUN IS OFFERED BY THE DE VILBISS Company for cleaning and dusting operations where either a high or low pressure air supply is available. The gun, which rests comfortably in one hand, is operated by a thumb controlled button. It is attached directly to air lines and may be used in any convenient position.

THE INDEX MACHINERY CORPORATION HAS ANNOUNCED a complete line of Lester-designed fully-automatic injection molding machines, which operate either automatically or semi-automatically. For semi-automatic operation a single lever is provided, conveniently located for the operator. When running automatically, the machine is controlled by three electric time clocks, which, with the controls, start-stop button for the main motor and relays are arranged in a control panel on the operators side of the machine, easily accessible by opening a door. Models are available in capacities of four, six and eight ounces per shot.

A NEWLY-DESIGNED BENCH TYPE GREENERD ARBOR PRESS for production work has been announced. The hydraulic pressure, which may be set from fifty pounds to one and one half tons, is controlled by a hand lever.

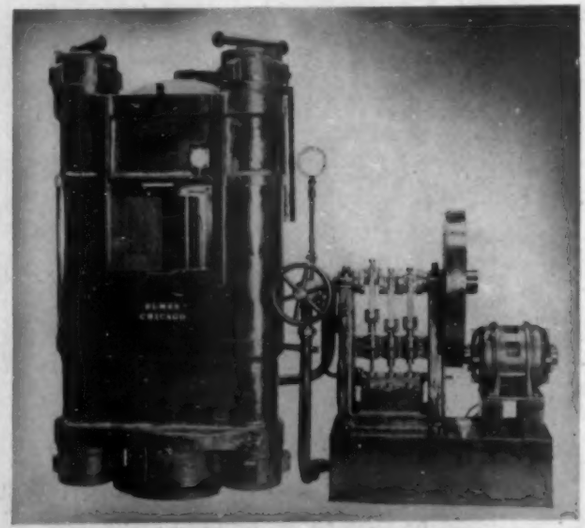
A REDUCTION, REPORTED TO BE TWENTY PERCENT, IN THE molding cycle has been obtained through use of a newly-designed preheating oven installed by the Despatch Oven Co. at the Armstrong Cork Company's Plastics plant. Four presses turning out bottle closures are supplied from this equipment. An electrically driven fan maintains an even temperature throughout the oven and with thermostatic controls assures accurate heating of the material.

A NEW ILLUMINATED MAGNIFYING GLASS ORIGINALLY DEveloped for use on Doall equipment but adaptable to a wide range of machine tools has been placed on the market by Continental Machine Specialties Inc. In addition to giving closer illumination to the work on the machine, the device permits greater accuracy when working to precision specifications.

A SERIES OF ROTARY AND MILLED CUT FILES HAVE BEEN recently put on the market by the Grobet Files Corp. This class of filing equipment, which is finding increasing use in the finishing of molded thermoplastic and thermosetting materials, is offered in a number of shapes and types, available in either high speed or chrome steel.

AN IMPROVED PEDESTAL TYPE OF MOTOR DRIVE IS AVAILable for all sizes of South Bend Precision Lathes. A new double arm adjustable tension brace locks the pedestal motor drive unit rigidly in position when the lathe is in operation. Two turnbuckles, one on each arm, permit adjusting the cone pulley belt for any desired pulling power, and taking up belt stretch.

FOR SMALLER SIZE TAPPING JOBS MOST EASILY ACCOMMOdated by high speed precision equipment the Procunier Safety Chuck Co. offers a new Universal tapping machine. A foot operated control leaves the operator's hands free for handling the work. Cutting lubricant is supplied by an automatic forced system and a large working table is provided with return lubricant drain. A series of interchangeable tapping heads is also available.



THE CHARLES F. ELMES ENGINEERING WORKS HAS REcently designed a new fully enclosed die sinking and hobbing press. A heavy perforated guard is placed on the two rear sides of the press which with shatterproof glass guards in the front, give protection to the operator from injury in cases of breaking dies or flying chips. A simple depth gage is furnished graduated in thousands of an inch. Operating the press, a single handwheel is used for control, turning one way lowers the platen and reversing it raises it. The pumping unit consists of a three plunger pump driven by a five horsepower electric motor. The whole unit rests on a base which serves as a 20-gallon oil reservoir.

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...the R. D. Wood Company provides hydraulic presses in a wide variety of types and sizes. Be sure to consult Wood engineers regarding your press requirements.

A 30 ton HydroLectric laboratory press with variable pressure pump and loading elevator. Pressure range—2 to 30 tons.

(Left) This 50 ton HydroLectric precision type molding press is operated by a two-pressure rotary pump at 200 pounds low pressure and 1000 pounds high pressure.

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HYDRAULIC PRESSES and VALVES for EVERY PURPOSE

IN REVIEW

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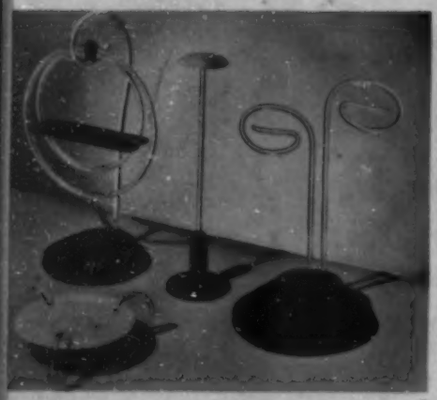

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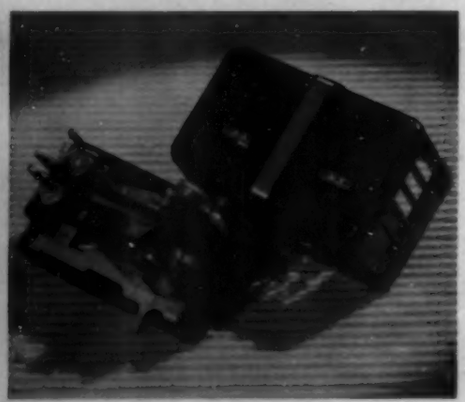

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1. The Spencer Lens Company has designed this sub-stage lamp to throw a strong beam of light through specimens being studied under a microscope. The molded Bakelite housing enables it to withstand the hard abuse and minor accidents that happen so frequently in laboratory work

2. Poloron Products avoid the nuisance of hard-to-open and bent caps on their large-mouthed vacuum jugs by utilizing molded phenolic in place of aluminum

3. Joseph H. Meyers has given merchandise displays a new filip with his crystal-clear Lucite stands for showing hats, accessories etc. A full line of unusual shapes that meet many needs in the display of different kinds of merchandise is being made

4. Brand new is this "mad money" button which neatly holds a dime concealed under the screw-on cover. It may be sewn on clothing or bathing suits. Besides being used to carry an emergency reserve, it will hold powder or rouge. Colt Patent Fire Arms Co. molds it of Plaskon

5. Coins may be easily inserted or withdrawn from the Jiffy coin holder. At the same time the resiliency of injection molded Tenite allows the coins to be securely held in place

6. Supertherm, a new thermostat by Barber-Colman Company, has a molded Durez case as well as base and supporting parts. Because this material is unaffected by temperature and humidity, the precision controls are enabled to function perfectly in accordance with atmospheric changes and are in no way affected by the housing material

7. This transparent oiler must withstand the vibration and continuous oscillation of heavy machinery. Gits Brothers Manufacturing Company chose Tenite because it is impervious to oil and normally unbreakable

8. Robert Budlong has designed this light, compact timing device for the American Timer Corporation. It may be used to start and stop any electrical appliance either in the home or elsewhere. Durez was used by the Richardson Co. in molding its housing

Manufacturers' addresses will be sent if you will write to the Editor, enclosing 3-cent stamp for reply

It's News Again!

Seems the A-P Thermostat is always news.

It was page 1 when it first appeared and was featured by Modern Plastics in a lead story back in June.

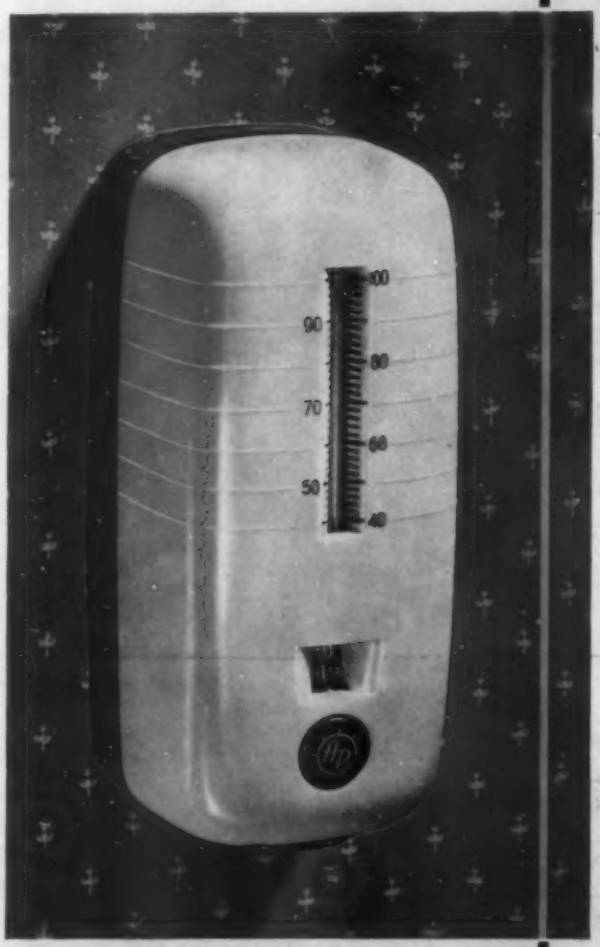
And now just a few months later, it's *back in the headlines* . . . receiving the honors of Modern Plastics Competition judges.

We're mighty proud of having been chosen to produce it. We made the molds . . . and did the molding of all four plastics pieces.

We're grateful to the judges . . . and hope to be amongst the winners again next year.

We'd like to help *you* get honors next year.

Why not drop us a line. We'd appreciate the chance to tell you what we could do with *your* product!



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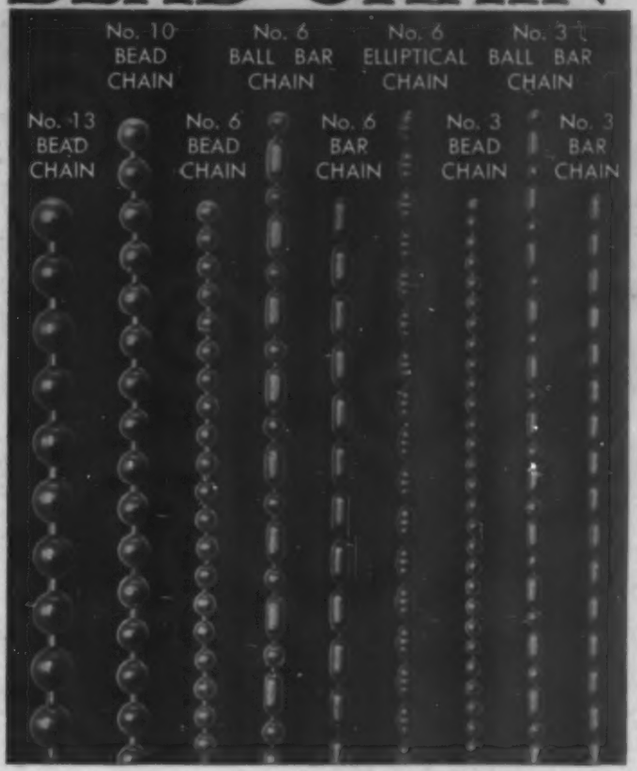
No. 10 BEAD CHAIN
No. 6 BALL BAR CHAIN
No. 6 ELLIPTICAL CHAIN
No. 3 BALL BAR CHAIN
No. 13 BEAD CHAIN
No. 6 BEAD CHAIN
No. 6 BAR CHAIN
No. 3 BEAD CHAIN
No. 3 BAR CHAIN

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BEAD CHAIN* cannot kink nor tangle. It is strong. No. 3 *(shown above)* has a 15-lb. tensile strength; No. 13 has 85 lbs.

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THE BEAD CHAIN MANUFACTURING CO.
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***Reg. U. S. Pat. Off.**

IN REVIEW

9

10

9. A modernized version of a cribbage board is the molded Durez figure-eight, arranged with an ash tray between the halves, molded by the Ward Plastic and Rubber Company

10. Architects and decorators will be interested in the possibilities indicated by this imported French coffee table. The top is a laminate made by the French affiliate of Continental Diamond Fibre Company, using a process that enables decoration without use of inserts or colored materials

11

12

11. A smart innovation in beauty requisites, the Marlowe Cosmetic Bracelet. Fabricated from cast Bakelite resin, the piece has an embossed metal band, which when turned, reveals three receptacles holding mirror, powder puff and rouge. Thus an attractive piece of jewelry eliminates the need for a pursefull of cosmetics

12. This urea cigaret box holds a full pack and keeps pocketbooks free from loose tobacco. The lid may be kept tightly closed or firmly open by the snap hinge. The caps are molded in colors contrasting to the ivory of the case itself. Both are Bakelite

13

14

13. Either in black phenolic or ivory urea, the Knapp Shaver is reported to give a close shave without the usual learning period. The molded housing provides comfortable grip, easy cleaning, smart appearance

14. Black phenolic was chosen by Clipshave Inc. for their new Hanley AC electric shaver because of its permanent luster, insulating properties and adaptability for easy assembling

15

16

15. We repeat these Sun-Ex blinkers this month because we learned they were erroneously credited in our September issue. They were made by Lapin-Kurley Kew Inc., and are distributed by them exclusively

16. Airguide Junior, designed for home use by Fee and Stemwedel, Inc., accurately indicates temperature and moisture content of the air. Its Bakelite case protects the delicate, sensitive mechanism and provides a good background for the dial

Manufacturers' addresses will be sent if you will write to the Editor, enclosing 3-cent stamp for reply

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MODERN PLASTICS
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PLASTICS FEATURE PROGRAMS

(*Continued from page 66*) dependent on the complete thermal history of the sample. The d.c. conductance increases with time and temperature of aging, and corresponding changes appear in the dielectric constant and its frequency coefficient, and in the a.c. loss factor. It is shown that the d.c. conductance, as an auxiliary independent variable, summarizes the effects of thermal history of the sample.

PROPERTIES AND APPLICATIONS OF SOME OF THE VINYL RESINS, by S. D. Douglas. The characteristics and practical applications of some vinyl resins are described. Vinyl chloride resins are used as wire insulation and as lining material in chromium plating baths. Vinyl acetate resins serve as adhesives in sealing fiber cartons, milk bottle caps, and in gumming tapes. Vinyl acetal resins are of particular importance in the laminated glass field. Resins formed by copolymerization of vinyl chloride and vinyl acetate are suitable for fabrication of various articles by compression and injection molding and for extrusion as insulating wire tubing.

DIELECTRIC CONSTANT AND LOSS OF PLASTICS AS RELATED TO THEIR COMPOSITION, by W. A. Yager. Data are presented for the frequency variation of the dielectric constant and dielectric loss factor of various plastics over a broad frequency band extending from 1 kc. to 35 mc. The extremely low loss of polystyrene compared to that of polar plastics confirms the theory that a hydrocarbon is inherently more satisfactory from a dielectric point of view. Of the several possible mechanisms of dielectric loss which might account for the high-frequency dielectric absorption observed in polar plastics, the rotation of polar groups and that of repeating units containing polar constituents appear most probable. The fact that the loss factor maxima of phenol fibers, phenol fabrics, and phenol- or urea-formaldehyde molding compounds containing cellulosic fillers occur at essentially the same frequency is viewed as evidence that this dielectric absorption is an intrinsic property of cellulose. Substitution of mineral fillers for cellulose reduces the high-frequency loss to that residing in the polar resin binder. Furthermore the dielectric loss of mineral-filled molding compounds is less moisture-sensitive. The large increase in dielectric loss at low frequency always found in materials of relatively high free-ion conductivity manifests itself in neoprene and the humidified phenolic plastics containing cellulose fillers or laminations. The plasticizer in Koroseal is responsible for the relatively high dielectric loss of this product.

DIELECTRIC TESTS ON FILMS OF SHELLAC VARNISH, by E. Ackerlind and E. Weber. The recommended film thickness for test is about 0.09 mm. Thicker films show an increase of dielectric constant with increasing applied voltage. This voltage effect is probably due to residual alcohol in the film. The dielectric constants of a film at 60 and 1000 cycles per second approach the same value as the time of drying increases. Exact dielectric constants of shellac are difficult to obtain due to the effects of voids, contact, edge, penetration of mercury into the film, and residual alcohol and water.

THERMOSETTING RESINS, by V. E. Meharg. The physical and chemical properties of the phenol and urea resins are reviewed. The ability of thermosetting resins in the initial low state of polymerization to wet fillers thoroughly, thus promoting the bonding action is emphasized. Miscellaneous applications of these materials in the electrochemical industry are cited, in particular the use of phenolic laminated in the construction of plating barrels for acid nickel baths.

METHACRYLIC ESTER RESINS, by H. R. Dittmar, D. E. Strain, and R. G. Strain. The properties of the polymeric esters of methacrylic acid render them suitable for general industrial uses as coating materials and as thermoplastic adhesives applicable in the form of lacquers, solvent-free hot melts, and emulsions. Because of their good electrical properties these resins can be used in wire enamels, transmission cables, finishes for electrical equipment, and as impregnants for many types of electrical coils.

A STUDY OF THE VISCOSITY AND DIELECTRIC DISPERSION OF METHACRYLATE RESINS IN BENZENE SOLUTIONS, by G. W. Gross, H. C. Ott, and O. M. Arnold. An experimental investigation was made of the viscosity and dielectric constant dispersion on benzene solutions of methyl, ethyl, propyl, *n*-butyl, and isobutyl methacrylate, and a copolymer of methyl methacrylate and ethyl acrylate. A distinct difference is shown to exist in the densities and viscosities of the respective solutions. A dielectric constant dispersion dependent upon the frequency of the alternating current applied was observed in the frequency region 1,000 to 10,000,000 cycles. The magnitude and shape of the dielectric dispersion curves indicate differences in the polar characteristics and molecular weights of these resinous polymers determined by the chemical nature of the materials used and by the conditions imposed on the system during their formation.

Plastics Group, American Chemical Society

NEW FIELDS FOR PLASTICS, by A. J. Weith. The various plastics which have been developed in the search for a tough transparent material free from the objectionable brittleness and high specific gravity of glass are reviewed. These "organic glasses" have only begun to make inroads in fields formerly limited to the inorganic glass, such as windshields for airplanes, cars, and trains, watch crystals, lenses, goggles, and coatings that rival glass enamels. Transparent phenolic resins, cellulose acetate, and acrylate, methacrylate, and styrene resins are among the plastics considered in detail. But now a strange anomaly presents itself. The glass industry begins to push into fields where plastics former-

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SAMSON MOLD STEEL
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3. **IT'S TOUGH** A carburizing steel with "controlled grain size" - Samson is safer to harden, resists upsetting, and reduces premature service failures.
4. **IT'S EASILY HOBBED** Samson has good hobbing qualities. It is very uniformly annealed—takes a high polish.
5. **IT'S READILY MACHINED** For machined mold, Samson mold steel is furnished in a special temper that machines at about the same speed of S. A. E. 1020.

Here's a steel you can safely adopt as standard for more than 90% of your jobs. But Carpenter's extensive experience in working with the plastic molding industry has lead to the development of 3 other mold steels to meet special requirements. For complete working data on Samson and these special steels, send for the illustrated 18 page bulletin. It tells you how to select safe mold steels and how to heat treat them for uniform results.

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Well-known European specialist in the manufacture of organic plastics seeks American connection for research, supervision, general management, or in an advisory capacity. Valuable new inventions available. Could make modest investment. For further information address: Editor, Modern Plastics.

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WILL BUY FOR CASH:
Hydraulic Molding Presses, Pumps,
Injection Machines,
Hydro-Pneumatic Accumulators,
Preform Machines,
Pebble Mills, Grinders, etc.
Send details of all your idle equipment. Reply Box 228, Modern Plastics.

•

"Wanted for immediate and future deliveries Plastics raw-materials surplus, nitrate and acetate waste, casein scrap, fillers, chemicals, colors. Send details concerning price and quantity. Reply Box 245, Modern Plastics.

•

WANTED: Expert mold designer capable of assuming charge of the drafting room in one of the old reliable plastic molding plants in the East. Reply in confidence, giving your reasons for wanting to change and stating your qualifications in detail to Box 248, Modern Plastics.

•

Engineer with over 15 years Plastics experience available after Nov. 15th. Background covers technical, research, experimental, markets, applications, tool and parts design, plant operation. Thorough working knowledge all plastics materials. Wide following among fabricators and consumers. Reply Box 247 Modern Plastics.

•

BUTTONS: New York Sales Representative has strong following with jobbers. Can produce volume. Seeks a manufacturer who has a suitable product for that trade. L. Raven, 570—7th Ave., New York, N. Y.

•

Will buy used Laboratory Press. Give details in quoting. Reply Box 249 Modern Plastics.

•

Synthetic Resin Chemist available. Ph.D. 1935 in organic chemistry from prominent Eastern University. Three years research and sales development work with large company. Still employed but seeking change. American of English ancestry, married, protestant, congenial, age 29. Publication. Patents. Eastern location preferred. Reply Box 250, Modern Plastics.

ly held sway. It is almost as if they sensed an approaching battle and were rapidly bringing up reinforcements. Glass "wool", so long an article in the laboratory, now is woven and spun into commercial fabrics. Even radio tube bases, one of the first uses for plastics, can be molded of glass. Glass and plastics, however, are joining hands to supplement each other in many commercial articles, for example, in radio bezels and in new closures for acid bottles. Truly it is a changing world, and people may live in "organic glass" houses and throw all the stones they want, while martyrs can wear "hair" shirts of woven glass styled in the most modern manner.

METHACRYLATE RESINS, by D. E. Strain, R. G. Kennelly, and H. R. Dittmar. Data are presented on many physical properties, solubilities in various organic solvents, and compatibilities with resins and plasticizers of methyl, ethyl, propyl, butyl, and isobutyl methacrylate resins. As the molecular weight of the esterified alcohol radical increases, the polymers become softer and more plastic. Filmforming and adhesive properties, as well as solubility and compatibility, also change markedly along the series from the methyl ester to the higher esters. The higher esters become increasingly more miscible with aliphatic type solvents, the butyl and isobutyl ester polymers being soluble in petroleum solvents. These resins are compatible with a large number of other resinous materials and plasticizers and, in general, as with the solubilities, the higher methacrylate esters exhibit a wider range of compatibility than the methyl ester.

MAKE MINE BLACK

(*Continued from page 59*) of metal. Weight of the unit was lowered resulting in lowered shipping costs.

From here on, various useful accessories have been added which have continued to send sales soaring. A plastic table pad for the lower bowl and a plastic cover for the top bowl became part of the ensemble. A matching colorful oval buffet tray was also added. The next year, the lower bowl was given a colorful and protective scalloped neck band of plastic, and a large circular serving tray could be obtained as part of the de luxe set. Last year a plastic creamer and sugar was included. This year another plastic handle has been provided for the upper bowl to facilitate handling, and to reduce breakage by dropping.

Profiting by these experiences, another manufacturer of such equipment lays considerable stress in all advertising upon the many plastic parts in his set. Emphasis is placed upon the outstanding characteristics of the molded parts.

As a manufacturer of a home product selling in a highly competitive market, he obviously recognizes that public opinion has been well established. That the average housewife, if such person exists, knows the value of plastics in the home and wants to buy them.

ALL the plastic parts (bases, mountings, etc.) of Bulletin 9115 Manual Motor Starters, "the 'heart' of the new Cutler-Hammer line", are produced with molds cut on Gorton Die and Mold Machines. For very practical reasons, Gorton Machines are helping to build this new starter of advanced engineering design, and are an essential part of the modern tool rooms of the leading motor control manufacturers.

The tool room likes them for their flexibility in small mold work, their ease of operation and maintenance, and their facility for producing accurate work with least time and effort. Management likes them because they have cut deeply into mold costs and speeded up plastic production.

GEORGE GORTON MACHINE CO.
1100 13TH ST. RACINE, WIS.

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The Offices of
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MODERN PACKAGING
and the
PACKAGING CATALOG
Are Now Located in the
CHANIN BUILDING
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Singled out for honors . . .

was the Redington Counter Wheel . . . *double* injection molded by Gits.

"Double injection" is a new and unique process we have for making a permanent type of lettering *in* plastics. In making this product, the main wheel is molded first, and then used as an insert. The letters are filled up with a second injection in another die.

Ingenious? Yes—small wonder the judges singled it out for "Honorable Mention." Yet it is merely typical of the manner in which Gits tackles *each* and *every* job . . . finding the best way to get best results.

See us for injection molding. We are specialists.

Phone - Write - or Wire
GITS MOLDING CORPORATION
4600 W. HURON STREET CHICAGO, ILL.
TEL. MANSFIELD 4146

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The intriguing new plastics industry is now brought to the screen for the first time.

What plastics are, how they are used, how they are formed... how industry benefits and products improve by their use...all told in interesting and dramatic fashion, in sound and color in this film.

In it are featured the winners of the Modern Plastics Competition of 1938—the best and most advanced of the newest plastic applications.

This great new picture will be available without charge or obligation to Industrial Organizations, Clubs, Colleges, Consumer Groups, etc.... Write at once if you desire booking.

MODERN PLASTICS

CHANIN BUILDING

122 E. 42nd St., New York, N. Y.

U. S. PLASTICS PATENTS

(Continued from page 76)

HYDROGENATED RESIN. H. S. Holt (to E. I. du Pont de Nemours and Co.). U. S. 2,130,800, Sept. 20. Hydrogenating a resinous polymer of dihydronaphthalene.

PLEATED FOIL. Jos. H. Brown (to Celluloid Corp.). U. S. 2,130,838, Sept. 20. Forming pleats in a heat-softened cellulose derivative foil and cooling quickly to set the foil in its pleated form.

COATING. A. W. Johnson and G. H. Young (to Stoner-Mudge, Inc.). U. S. 2,130,924, Sept. 20. A thermally stabilized coating composition containing a vinyl halide or ester resin.

SYNTHETIC FIBER. W. H. Carothers (to E. I. du Pont de Nemours and Co.). U. S. 2,130,947 and 2,130,948, Sept. 20. Making a salt of a diamine and a dicarboxylic acid; and making synthetic fibers from polyamides derived from diamines and dicarboxylic acids.

ESTER GUM PRODUCT. E. R. Littmann (to Hercules Powder Co.). U. S. 2,130,997, Sept. 20. Catalytic hydrogenation of a molten rosin ester.

CELLULOSE ETHERS. E. J. Lorand (to Hercules Powder Co.). U. S. 2,130,998, Sept. 20. Etherifying moist cellulose with an alkyl halide in presence of an alkali.

COLORED PLASTIC. F. Straub and H. Mayer (to Society of Chemical Industry in Basel). U. S. 2,131,154, Sept. 27. Dyeing nitrocellulose plastics with a complex metal compound of a logwood extract.

CORK COMPOSITION. G. B. Cooke (to Crown Cork and Seal Co.). U. S. 2,131,314, Sept. 27. Making a dyed cork composition by mixing cork particles with a dye solution, a heat-setting binder and a cork softening agent, and molding under sufficient heat to set the binder.

SEALING COMPOSITION. E. L. Baldeschwieler (to Standard Oil Development Co.). U. S. 2,131,342, Sept. 27. Use of a plasticized linear polymer of isobutylene in a calking and sealing composition.

WOOD SUBSTITUTE. G. J. Esselen (to A. S. Boyle Co.). U. S. 2,131,371, Sept. 27. A putty-like plastic which sets by exposure to air contains a vinyl or alkyd resin and a wood flour filler.

PANEL. H. B. Denman (to Detroit Gasket and Mfg. Co.). U. S. 2,131,728, Oct. 4. An automobile door panel having a layer of molding composition backed by a stiff base and faced with a fabric trim.

FILM BACKING. G. F. Nadeau and C. B. Starck (to Eastman Kodak Co.). U. S. 2,131,747, Oct. 4. Use of dyed polyvinyl phthalate as antihalation backing layer for a photographic film.

OIL-SOLUBLE RESIN. Israel Rosenblum. U. S. 2,131,757, Oct. 4. Condensing a higher homolog of cresol with at least 2 mols of formaldehyde in presence of dipentene, and heating the product with an acidic natural resin, to form an oil-soluble resin.

EMBOSSED COATED FABRIC. B. S. Armor and J. J. Walsh (to E. I. du Pont de Nemours and Co.). U. S. 2,121,882, Oct. 4. An embossed coated fabric with high luster on the hills and dull luster in the valleys is made with a pigmented nitrocellulose composition as the coating, the embossing members being arranged to pierce only the surface coat and not the undercoats.

CABLE INSULATION. E. Studt and C. Traugott (to Norddeutsche Seekabelwerke Aktiengesellschaft). U. S. 2,131,987, Oct. 4. An electric conductor with air space insulation is wound with a helix of polystyrene and covered with a jacket.

SHAPED ARTICLES. M. Hagedorn (to Agfa Ansco Corp.). U. S. 2,132,160, Oct. 4. A synthetic resin or cellulose derivative composition plasticized with an ester of a long chain aliphatic acid and a halogen hydrin.

LEAROK

The Clean Buffing Compound

LEAROK has no "free grease" in it. It is clean. It doesn't get into crevices and ornamentations. This, coupled with its excellent buffing properties, make it ideal for finishing plastics. LEAROK can be obtained tinted to match the color of the finished article.

Send a sample of your work for our recommendations.

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Waterbury, Conn.

Specialists in the Production of Clean-Working Buffing and Polishing Compounds

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INDUSTRIAL CHEMICAL CO.
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BAKELITE
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PLASTIC SPECIALISTS FOR MORE THAN 25 YEARS

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CASEIN PLASTICS

SHEETS—RODS and DISCS

- *Beautiful Colors*
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The waterproofness and flexibility of Pliofilm make it suitable for transparent rain capes and other apparel for showery weather. Also for moisture protection in packaging

Fully waterproof and durable, this transparent plastic is used here as a shower curtain, which not only keeps the water in the tub but also gives the bather full light for his ablutions

SYNTHETIC SUBSTANCES WITH RUBBERLIKE PROPERTIES

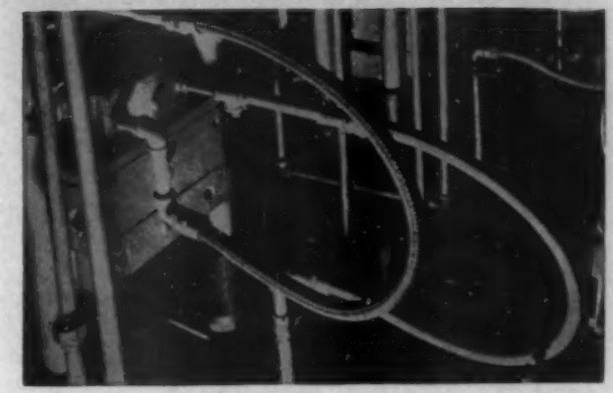
(*Continued from page 65*) volume may or may not be objectionable in itself, but the contamination of the oil is quite likely to be objectionable. Such contamination as occurs is usually due to added compounding ingredients rather than to the base material itself.

Sunlight resistance—The deterioration of rubber in sunlight is believed to be due primarily to surface ozonization. Most of the rubberlike synthetics are more resistant to this type of deterioration than is natural rubber and some of them may be compounded so as to be practically immune to this type of failure. The degree of difference in the resistance of the various synthetics is dependent upon the type of compounding ingredients used and the conditions of exposure, that is, whether or not the rubberlike product is under tension or is subjected to flexing or abrasion. Attempts have been made to evaluate sun-checking resistance in the laboratory by the use of a Fade-O-Meter or a similar intense source of artificial radiation, but it is generally conceded that the only reliable evaluation is a service test.

Abrasion resistance—It is impossible to speak of the abrasion resistance of rubber or any synthetic material without defining the exact type of compound under consideration and the type of abrasive condition that is to be met. Each of these synthetic products has been found to have abrasion resistance equal to or superior to that of rubber under conditions favorable to that particular product. However, it would be foolhardy to state that any synthetic product is equally or more abrasion resistant than rubber under all conditions of service. As a matter of fact, it is impossible even to state broadly that one rubber compound is more abrasion resistant than another. Pure gum rubber makes a more durable lining for sandblast hose than the type of compound used for tire treads; but pure gum rubber would make a very poor tire tread indeed. With respect to the thermoplastic products, it should be borne in mind that the heat generated during abrasion may be an important factor. The manufacturers of rubberlike synthetics are generally aware of the conditions under which their products show the best results and can tell a prospective customer what results may be expected under any given set of conditions. The final answer is, of course, a service test on a composition designed for the particular job at hand.

Elasticity—By elasticity we mean not extensibility but rather the ability of the material to regain its original form after removal of a force which has caused distortion. The rate and degree to which the product returns to its original dimensions are a function not only of the degree of distortion but of time and temperature. Generally speaking, the polymers of butadiene and of chloroprene have elasticity comparable to that of natural rubber. They may be either superior or inferior depending upon the kind and amount of compounding in-

REX-WELD flexible metal hose



Developed for platen presses, REX-WELD flexible metal steam connections insure constant tightness under alternate heat and cold. Exclusive one-piece construction—no packing, no leaking, no tightening. Use with Rex-Tite detachable metal-to-metal seat couplings for maximum service at minimum cost. Write for data.

CHICAGO METAL HOSE CORPORATION
(Formerly Chicago Tubing & Braiding Co.—Established 1902)
MAYWOOD, ILLINOIS (Chicago Suburb)

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FOR THE

PLASTIC INDUSTRY

LARGEST DOMESTIC SUPPLIERS
FOR OVER 20 YEARS

BECKER, MOORE & CO., INC.
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Make PLASTIC Molds

★ BAKELITE MOLDS ★ INJECTION TYPE MOLDS ★ DESIGNERS FOR ALL TYPES OF TOOLS & DIES ★ HOBBING A SPECIALTY ★

One of the Best Equipped Plants in the Middle West

● Having been making Bakelite molds since the inception of the art, we are thoroughly equipped to handle any type of plastic molds including the larger, more difficult jobs.

Our new plant with the most modern equipment is staffed by a corps of thoroughly experienced craftsmen that will give you the highest results in minimum time at economical prices.

Our customers number some of the largest in the Middle West. Let us quote on your next job.

For Better Molds and Tools and Dies Try Us

THE WEBSTER CO.
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Bausch & Lomb Slide Viewer for color film slides. Gives a brilliant magnified view of color films with the illusion of a third dimension.

The price of Quality
NEED NOT BE HIGH

This Bausch & Lomb job—a slide viewer for color films—had to be made to sell at a price competitive with low priced slide projectors, yet quality *had* to be consistent with Bausch & Lomb Optical Company's reputation for highest quality in optical instruments. Accuracy, too, was vital for no stray light leaks between the two halves could be tolerated.

These factors have brought many such jobs to Auburn. Our 60 years' molding experience, knowledge of short cuts, our careful attention to manufacturing detail and critical inspection at every stage of processing helped to keep the price down on this job while insuring the utmost in quality and accuracy—a thought worth bearing in mind on *your* next molded plastic job.

Established 1876

MOLDED PLASTICS DIVISION OF
AUBURN BUTTON WORKS, Inc.
AUBURN, N. Y.

gredients used and the conditions of test. The plasticized polyvinyl resins are quite elastic at low temperatures but, of course, suffer plastic flow at elevated temperatures. The alkylene polysulfides have elasticity comparable to that of rubber when measured under conditions of test that involve only momentary impact, such as the bounce of a ball. However, when distorted by a load that is applied over a period of time they show considerable plastic flow. This is especially true if the test is conducted at elevated temperatures.

Chemical resistance—The rubberlike synthetics are generally more resistant to oxidation and to the destructive action of chemicals than is natural rubber. Obviously, however, the chemical resistance and oxidation resistance depend to a great extent upon the nature of the added compounding ingredients and the conditions of vulcanization (for those that are vulcanizable). Moreover, all of these products have their weak points. The alkylene polysulfides are attacked by alkalies; certain modified butadiene rubbers are attacked by polar compounds; chloroprene rubber and the synthetics in general with the sole exception of the plasticized polyvinyl resins are vigorously attacked by strong oxidizing acids such as chromic. The manufacturers of these products are generally able to provide information as to their suitability for use in connection with any given chemical.

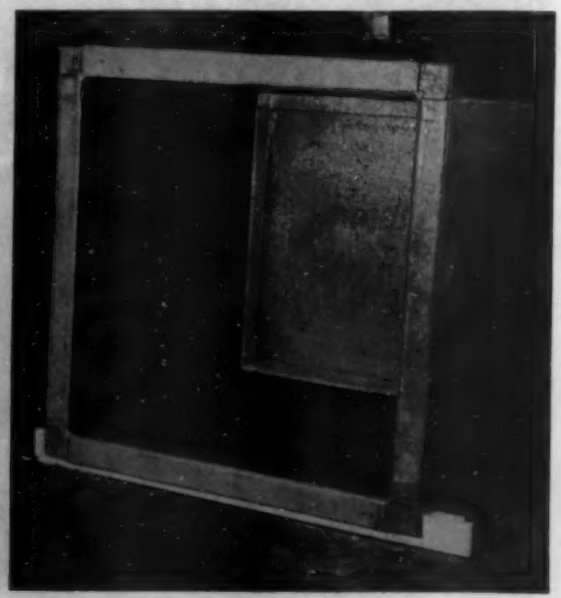
Heat resistance—There is no rubberlike material that is not affected to some extent by even moderate degrees of heat such, for example, as 100 deg. C. Some of the butadiene polymers and the chloroprene polymers can be compounded to have greater resistance to heat than the best heat resistant natural rubber compounds, but it does not follow that any compound derived from polymerized butadiene or polychloroprene will have greater heat resistance than any rubber compound. Heat resistance is, of course, an indefinite term that requires definition before exact statements can be made regarding it. It is impossible to set the maximum temperature that any compound derived from rubber or a rubberlike synthetic will withstand without specifying time of exposure, conditions—whether exposed to air or to oils or to neither—and the degree and type of deterioration that may be tolerated before the product becomes unserviceable.

Specifications and testing methods

It has previously been emphasized that a service test is the only test that will definitely determine the relative serviceability of rubber and the various rubberlike synthetics for any purpose and that, where a service test is impractical, laboratory tests should be designed to simulate as closely as possible the conditions of service. It is frequently necessary to provide some means of accelerating tests in order to get the answer in a reasonable length of time. Great care must be exercised in devising accelerated tests that will really be comparable to a longer test under conditions more closely approaching those encountered in actual use.

Certain rubber products that are used in substantial quantities for industrial purposes are purchased to specification. Frequently such specifications call for a product having a certain minimum tensile strength, ultimate elongation, cold flow or other readily determinable physical properties. One should not lose sight of the fact that the properties of the rubber that are made the basis of the specification are frequently properties that come into play to a minor extent, if at all, in actual service. For example, rubber is seldom used under loads which even approach its ultimate tensile strength and hence the only excuse for specifying tensile strength is that there may be some relationship between the tensile strength of a rubber composition and the less readily determinable physical properties which are directly related to the serviceability of the finished product. This assumption is frequently contrary to fact as applied to rubber goods, but there is even less basis for assuming that because a type of natural rubber or chloroprene rubber having a certain tensile strength has been found to do a certain job satisfactorily that any other synthetic

Part of the treatment given steel in production is pickling in dilute acids to remove rust and scale. The lining of tanks used for this purpose must not deteriorate. Koroseal provides this resistance and also maintains a better bond with the walls of the tank (right). Delicacy and fine detail may be obtained in plaster casting work using this material as shown below



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HYDRAULIC VALVE

GREATER EASE AND FLEXIBILITY OF CONTROL

THE HIGHER THE PRESSURE THE TIGHTER THE VALVE

AUTOMATICALLY REGRINDS OWN SEALING SURFACES

LONG TROUBLE-FREE LIFE LOW MAINTENANCE

QUARTER CENTURY OF SUCCESSFUL USE

Made in straightway, three-way and four-way types — Write for Bulletin H-2-C

YARNALL-WARING COMPANY
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Unusual Need Met by Unusual Molding!

Plastics in the chicken farm business?

Yes—because metal rusts . . . wood warps . . . leaving plastics a "natural" for this product, part of a device for watering chickens.

Note the *five* wafer-thin ribs on the piece. Filling out those parts of the mold is one big job. Yet AICO engineers ironed out the difficulties in jig time . . . soon had production running smoothly and perfect . . . the ribs straight, even, and unbelievably strong.

Chicken business . . . radio business . . . furniture business . . . *all* businesses are today benefiting from the superior molded plastics turned out by American Insulator Corporation. For here a group of practical, versatile engineers have at their disposal every type and size of press . . . complete, modern equipment . . . to meet their (and your) every need.

Why not let them show you what they could do for *you*?

AMERICAN INSULATOR CORP.
NEW FREEDOM, PENN.

GRIND 200 Lbs. OF SCRAP PER HOUR with the RAPID PLASTIC GRANULATING MACHINE!

Or use its smaller size and get 100 lbs. per hour! Simple in design, rugged in construction, these machines render efficient service for years on end. Best alloy steel is used for their blades and cutters. Spindles are made of high tensile alloy steel, hardened and ground, and mounted on Timken Roller Bearings.

Each machine comes with two different sized screens, ½" and ¾", interchangeable in two minutes . . . . and with underneath chute to carry granulated plastic to basket.

Investigate these money-saving machines now. Write for folder and full information.

LEOMINSTER TOOL CO., Inc.
272 Whitney St. **Leominster, Mass.**

Mfrs. of complete line of equipment for Catalin, Celluloid and Plastic Molding **AND EXTRUSION MOLDING DIES.**

IT TOOK A NEW METHOD TO MAKE THIS NEW, IMPROVED FLOCK

Although Claremont has led its branch of the industry for over 20 years, we were still not content with our product.

So we designed and built *special* equipment . . . radically different from other machines . . . to assure lower cost production and a product of longer fibre, greater cleanliness and constant uniformity.

This equipment is exclusive to Claremont. The method of production is hence exclusive . . . as is the accompanying quality.

Place your problems before us. No obligation.

CLAREMONT WASTE MFG. CO.
CLAREMONT **NEW HAMPSHIRE**
THE COUNTRY'S LEADING MAKERS OF COTTON FLOCKS

Left, Thiokol nozzles on gas pump hose will not mar nor scratch car fenders. Above, hairline accuracy in printing on smooth hard surfaces is obtained with plates of this material.

or natural product would be inferior if it failed to display that same tensile strength. Generally speaking, the conventional tests used in specifications are grossly inadequate as a measure of the serviceabiiity of some new product that may be offered to do a certain job, but may be valuable as a means of checking the uniformity of succeeding deliveries of a product which has been completely evaluated by adequate performance tests.

Conclusion

It has been pointed out that the products included in the broad terms "synthetic rubbers" and "synthetic rubberlike materials" have little in common except the ability to stretch to several times their initial length before breaking. In fact, there is less similarity between some of these synthetic products and others than there is between some of them and natural rubber. Moreover, the properties of some of these synthetic products may be varied over such a wide range by compounding with other ingredients and vulcanizing under varying conditions that it is unsafe to generalize about any of them. The difficulty of drawing valid generalizations is further complicated by the fact that such terms as "oil resistance", "abrasion resistance" and "heat resistance" are devoid of exact meaning and, if valid conclusions are to be drawn regarding these or any other physical properties, the measuring methods must be exactly defined.

The only way to ascertain whether a rubberlike synthetic product will be suitable for a specific use is to analyze the conditions of service, prepare a composition whose properties approach as closely as possible the ideal revealed by that analysis, and test that composition under conditions related as closely as possible to those that may be encountered in service. It will probably never be possible to tabulate the properties of rubberlike synthetics in so comprehensive a manner that the engineer will be able to select the right product for any particular use by consulting a handbook. Today, at least, it is true that any general tables of properties that may be prepared would be so misleading as to do more harm than good. The engineer who would use rubber or rubberlike synthetics wisely must accept these facts and work within the limitations imposed by them.

[1] J. Ind. Eng. Chem., *25*, 1204 (1933).
[2] Wright, J. G. E., Chem. & Met. Eng., *39*, 438 (1932).
[3] Patrick, J. C., U. S. Patent 1,890,191 (1932) and Trans. Faraday Soc., *32*, 347 (1936).
[4] U. S. Patent 1,672,156.
[5] Semon, W. L., U. S. Patent 1,929,453.
[6] Hayden and Krismann, J. Ind. Eng. Chem., *25*, 1219 (1933), Bridgwater, E. R., J. Ind. Eng. Chem., *26*, 33 (1934); "The Neoprene Handbook", E. I. du Pont de Nemours & Co., Inc.; "The Neoprene Notebook", E. I. du Pont de Nemours & Co., Inc.
[7] "Perbunan", Advance Solvents and Chemical Corp.
[8] "Thiokol Facts", The Thiokol Corp., and Martin and Patrick, J. Ind. Eng. Chem., *28*, 1145 (1936).
[9] Brous and Semon, J. Ind. Eng. Chem., *27*, 667 (1935) and "Koroseal," The B. F. Goodrich Company.
[10] Wright, J. G. E. (supra).
[11] Scott, Trans. Inst. Rubber Ind., *5*, 95 (1929).
[12] Hayden, O. M., Proc. Amer. Soc. for Testing Materials, Vol. 34 (1934).

COLLEGE COLORS

(*Continued from page 58*) suggest that you add to that result the 5,600,000 high-school and academy pupils, who are proving as enthusiastic as their college elders, to get the dimensions of the tailor-made market the "Varsity" enjoys.

Stewart-Warner was pretty cagey about the whole thing, believing that they would be wiser to test the idea out before they promised anything they couldn't deliver. Accordingly, the production department made sure the sets *could* be produced in any color or combination of colors, matching the sets up with actual color samples. Once sure of their ground, they shipped out the sets and said "Shoot!" They are still dodging the results of that order, but meanwhile a large and happy smile plays over the countenance of L. L. Kelsey, who finds his first venture into the plastic cabinet field an overnight best-seller. He points out that the idea can and will be logically applied to all fraternal organizations, scholastic and otherwise, with equal expectation of success, and that the peak reached at school's starting can probably be equalled at Christmas, Commencement and Home-Coming.

Clever merchandising features the drive, with dealer-tie-ins through display and direct-mail, special showings in campus bookstores, sporting goods stores and department store college shops. The recent display in Lyon & Healy's (Chicago) window, for instance, proved a

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LABORATORY TESTING PRESS LINE

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Hand Operated and Adjustable

It includes 10, 20 and 30 ton capacity and up, with every feature for *Molding Tests.*

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By developing special inks and special equipment, we have met the plastic industry's demands for a practical method of printing on plastic surfaces.

The MARKEM method is simple and low in cost. Printing can be done on curved or flat surfaces . . . and at speeds that guarantee top-most efficiency.

Behind the system is a firm that for over 27 years has specialized in developing printing and marking methods for unusual materials.

Let us show you how . . . and how much . . . you can benefit by using this system.

MARKEM MACHINE CO.
KEENE, NEW HAMPSHIRE

NEW MACHINES AND MODERN METHODS

TOOLS · JIGS
GAUGES · MOLDS
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produced on the

DECKEL FP1 UNIVERSAL MILLER

AT COST SAVING SPEED —AND— WITH PRECISION

THE DECKEL FP1
MILLS · BORES · COUNTER-BORES · DRILLS · SLOTS

Horizontal and Vertical at any angle—in One Set-up

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INJECTION MOLDING

All Suitable Materials

SMALL PARTS
for Mechanical
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COLUMBIA PROTEKTOSITE CO., Inc.
Carlstadt, New Jersey

"stopper." In addition, campus leaders are endowed with a radio and instructed to show it to all and sundry, with the chance of making some extra money through their missionary work on campus. Coeducational schools, of course, afford the largest market, but at last report retailers serving swank Vassar, Smith and Wellesley were also liking the idea.

The proposition was not without its headaches from the production standpoint, what with keeping colors uniform and the inexactness of color names. A university may announce its colors as orange and blue, for instance, as both Illinois and Michigan do; but the Illinois colors are dark blue and (almost) old gold, while Michigan's are royal blue and maize. Result of this situation was close and careful checking on all sets, but due to an efficient spraying set-up, Stewart-Warner is able to deliver any college's own set within a week after order.

The manufacturer isn't forgetting either, that the Varsity by any other name will look as sweet, and the brown phenolic and white urea cabinets are also being aggressively pushed. Stewart-Warner, convinced that it has the best-looking set on the market, is happy about the whole thing.

LAMINATED PHENOLICS GET AROUND

(*Continued from page 55*) is manufactured in tubular or plate form. It is suitable for cold punching up to $^1/_{16}$ in. thick and for hot punching up to $^1/_8$ in. thick. These parts must be able to withstand moisture, so that they will not increase in size or lose insulating quality. Of equal importance, they must not decrease in size, crack or break down, if the radio is to remain in perfect adjustment and give the service that each owner expects.

So, from the delicate and accurate support of metallic contacts in a sensitive radio set—which must insulate as well as provide a permanent fastening—to the rugged wear and tear of steel mill bearings, phenolic laminates have given service which points their way to new and untried applications. If they can hold their own as bearings for ships propellers against the tides and storms of ocean travel, and if they can depend alone upon water for lubrication, as they have demonstrated that they can, then it is reasonable to believe that industrial engineers will come to depend more and more upon their peculiar properties in future specifications. Being custom made materials capable of diversified make-up to provide special physical properties to meet different demands, laminated phenolics provide industry with a new measure of economical operation—and engineers with a new tool worthy of serious consideration.

CHARACTERISTICS OF LAMINATE*

Tensile Strength	Flexural Strength	Compressive Strength	Dielectric Strength	Water Absorption
Lbs. per sq. in.	Lbs. per sq. in.	Lbs. per sq. in.	Volts per mil.	24 hours
Laminate* for Block-Type, Tail-Shaft Bearings, Pump Valves, Piston Rings, Valve Seats				
9500	19,000	36,000	275	1.5%

Tensile Strength Lbs. per sq. in.	Axial Compression Lbs. per sq. in.	Dielectric Strength Volts per mil.	Water Absorption 24 hours
Laminate* for Pintel Bushings			
6500	15,000	80	6%
Laminate* for Sleeve-Type, Tail-Shaft Bearings			
5500	20,000	....	3%

* Micarta.

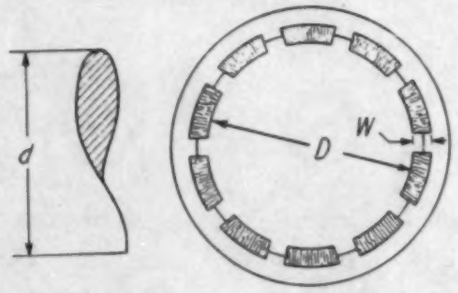
FORMULAE FOR FIGURING LAMINATED BEARING CLEARANCES[1]

BLOCK-TYPE BEARINGS

W = depth of blocks
d = shaft diameter
D = inside diameter of bearing
D = d + .007 W + .012*

Example:

Shaft diameter = 12″ = d
Depth of blocks = 1¼″ = W
Find inside bearing diameter with proper clearance.
D = 12 + .007(1.25) + .012
D = 12.021″ inside diameter

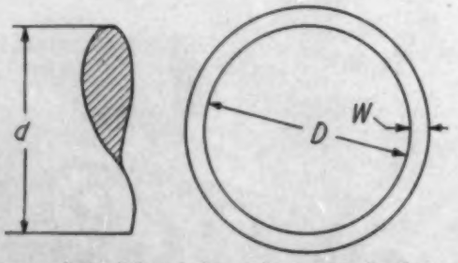


SLEEVE-TYPE BEARINGS

W = bearing wall thickness
d = shaft diameter
D = inside diameter of bearing
D = d + .04 W + .012*

Example:

Shaft diameter = 6″ = d
Bearing wall thickness = ½″ = W
Find inside bearing diameter with proper clearance.
D = 6 + .04(.5) + .012
D = 6.032″ inside diameter



***NOTE: This figure represents normal bearing clearance. Actual figure depends on standard shipyard practice.**
[1] Based upon the use of Micarta.